REPORT RESUMES

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RECRUITMENT AND TRAINING OF STAFF AND SUPPORT OF STAFF
DISSEMINATION ACTIVITIES AT THE AMERICAN LIBRARY ASSOCIATION
LIBRARY 21 EXHIBIT SEATTLE WORLD'S FAIR (B-252).
BY- LIEBERMAN, IRVING AND OTHERS
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A REPORT HAS BEEN PREPARED ON THE ACTIVITIES ASSOCIATED WITH THE LIBRARY 21 EXHIBIT AT THE SEATTLE WORLD'S FAIR. SECTION ONE OF THE REPORT COVERS A DESCRIPTION OF THE PHYSICAL EXHIBIT, AN ACCOUNT OF STAFF SELECTION CRITERIA, A SUMMARY OF THE ORGANIZATION OF THE INSTRUCTIONAL PROGRAM, AND AN EVALUATION OF THE PROGRAM AND THE ENTIRE LIBRARY 21 EXHIBIT. SECTION TWO HAS A DESCRIPTION OF THE EXHIBIT'S INSTRUCTIONAL PROGRAM WITH EMPHASIS ON THE IMPORTANCE OF SUCH ACTIVITIES IN LIBRARY DEVELOPMENT AT THE LOCAL, STATE, AND NATIONAL LEVELS. SECTION THREE OF THE REPORT COVERS THE IMPLICATIONS OF THE EXHIBIT FOR LIBRARY EDUCATION. A LARGE NUMBER OF ILLUSTRATIONS ARE PRESENTED IN THE APPENDIX WHICH SHOULD BE OF ASSISTANCE TO ANYONE PLANNING LIBRARY INSTRUCTIONAL PROGRAMS. (JC)

B-252

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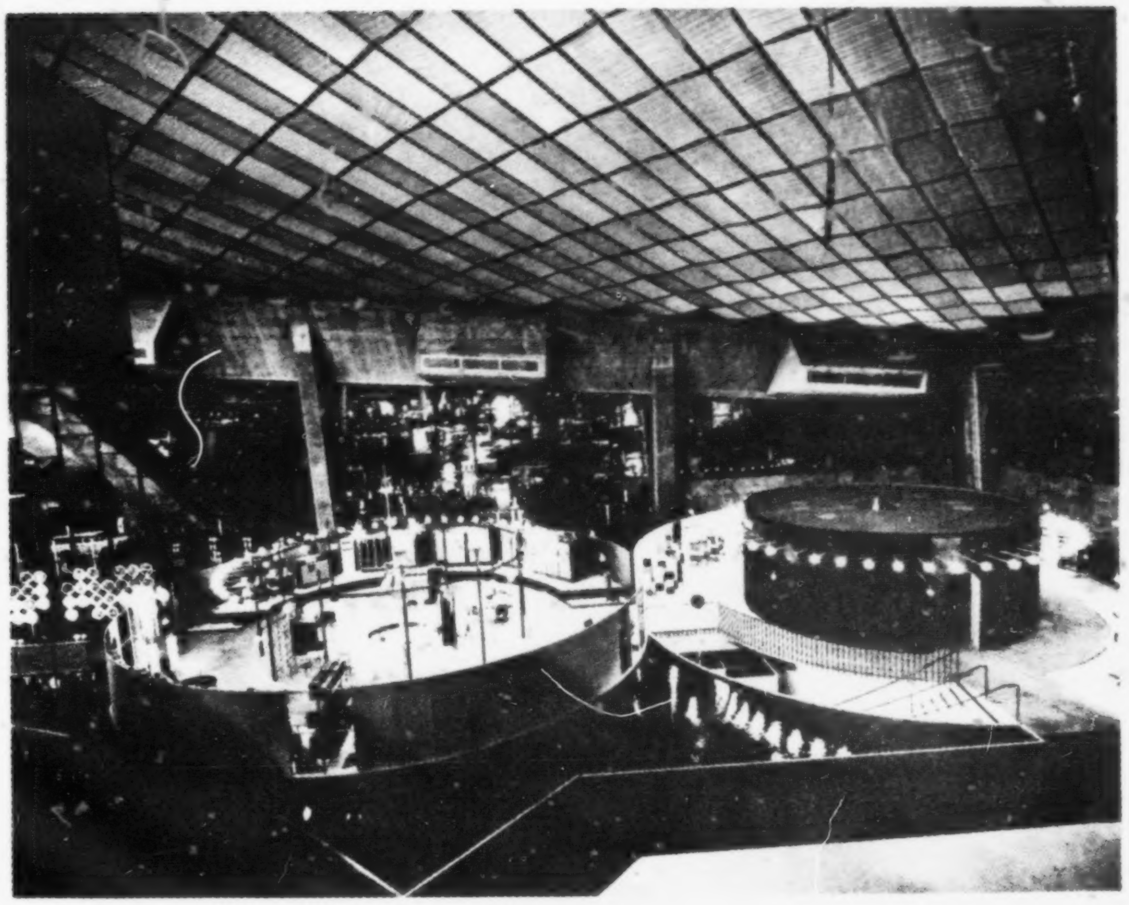
Recruitment and Training of Staff and Support of Staff Dissemination Activities at the American Library Association LIBRARY 21 Exhibit Seattle World's Fair (B-252)

A Report



School of Librarianship
University of Washington
Seattle 5
1963

In cooperation with the
UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Office of Education

Recruitment and Training of Staff and Support of Staff Dissemination Activities at the American Library Association LIBRARY 21 Exhibit Seattle World's Fair (B-252)

A Report

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PREFACE

This report has been prepared in accordance with the requirement of O. E. Contract #OE-2-16-013 (including Supplemental Agreement) between the U.S. Office of Education and the University of Washington.

The contractual funds were used for the travel and per diem of the professional library staff of the LIBRARY 21 Exhibit, Seattle World's Fair; the Administrative Office of the LIBRARY 21 Exhibit; and the instructional Program supervised by the School of Librarianship.

To administer the LIBRARY 21 Exhibit at the Seattle World's Fair during the six months of the Fair, and the pre-Fair responsibilities necessary for the selection of the staff as well as the closing activities following the Seattle World's Fair, an office for the Local Project Director was established. Mr. Gordon P. Martin, Assistant Librarian of the University of California Library at Riverside, served as the Local Project Director. He had the assistance of a secretary, Miss Hope Ohashi. A superior office facility with appropriate support activities was maintained without charge at the Seattle Public Library, Seattle, Washington

The Instructional Program for the professional librarians who made up the staff for the LIBRARY 21 Exhibit at the Seattle World's Fair was the responsibility of Dr. Robert M. Hayes, President of Advanced Information Systems, Inc., in Los Angeles and member of the Faculty of the University of California at Los Angeles. The support for the Instructional Program in terms of handout materials and visual aids came from his office. The program which was of one week's duration (repeated six times) was given in the General Engineering Building on the campus at the University of Washington with the exception of the final week of instruction which took place on the grounds of the Seattle World's Fair.

The University's administrative offices, particularly those of the School of Librarianship, the Office of University Research in the Graduate School, Contract Research, Purchasing and Payroll, were responsible for the expenditure of the funds. The Principal Investigator under the contract was Dr. Irving Lieberman, Director of the School of Librarianship, University of Washington.

An Advisory Committee appointed by the American Library Association composed of distinguished librarians, documentalists and personnel concerned with the newer educational media, was called upon for consultation. The names and addresses of the Advisory Committee are listed in Appendix B of Section I.

In addition, many members of the American Library Association gave considerable time in developing the content of the LIBRARY 21 Exhibit through their respective Divisions in the American Library Association. The staff liaison and overall supervision from Headquarters of the American Library Association was the responsibility of Alphonse F. Trezza, Associate Executive Director of the American Library Association.

The organization of the report which follows consists of a "Digest" of the Project prepared some time ago for the Office of Education and three Sections with appropriate appendices. Section I of the report was prepared by Gordon P. Martin, Local Project Director. This covers a description of the physical exhibit, an account of staff selection criteria and method, a summary of the organization of the instructional program and an evaluation of that instructional program by the professional library staff, and finally an over-all evaluation of the LIBRARY 21 Exhibit. Section II of the report was prepared by Dr. Robert M. Hayes, Visiting Faculty member. This is a description of the LIBRARY 21 Instructional Program with an emphasis on the importance of such an instructional program in library development at the local, state and national levels. Section III of the report was prepared by Dr. Irving Lieberman, Principal Investigator. It covers the implications of the LIBRARY 21 Exhibit for library education.

Reference is made to the large number of illustrations in the Appendix, particularly the illustrations of the items of visual material used to illustrate and supplement the Instructional Program. These would be a valuable assistance in any instructional program planned by the library schools of the country.

The original purposes of the Contract were, "To provide librarians with an educational experience in a machine-library environment; to explore professional reaction to the introduction of such entirely new concepts; and to evolve valid criteria for the development of advanced library school curricula". These purposes are dealt with directly in the three sections and the appendices of this Report.

The Learning Resources Center which was made possible by the Supplemental Agreement to the contract is described and illustrated in Section I of the Report. Resource personnel who assisted in evolving the content are listed in Appendix B. It is of particular interest that a great majority of the Fair visitors at the LIBRARY 21 Exhibit spent more time in this area than any other. Much can be learned from this experience report for developing similar exhibits concerning the newer educational media.

During 1963 a more complete report of the LIBRARY 21 Exhibit will be prepared by the American Library Association. The content of this report for the Office of Education will be included in the more detailed report which will have wide distribution. The American Library Association will be communicating with the Office of Education concerning this larger publication.

Many people gave unselfishly of their time and effort to make LIBRARY 21 a success. Heartfelt gratitude must be expressed to the professional and secretarial staffs of the libraries of Washington (state), without whom the exhibit could not have become a reality. Particular appreciation is due the personnel of the Washington State Library, Seattle Public Library, University of Washington Libraries, and the School of Librarianship of the University of Washington.

Irving Lieberman
Irving Lieberman
Principal Investigator

January 31, 1963
School of Librarianship
University of Washington
Seattle 5, Washington

DIGEST

RECRUITMENT AND TRAINING OF STAFF AND SUPPORT OF STAFF DISSEMINATION ACTIVITIES AT AMERICAN LIBRARY ASSOCIATION LIBRARY 21 EXHIBIT, SEATTLE WORLD'S FAIR (B-252)

Description: The American Library Association sponsored an exhibit at the Seattle World's Fair (Century XXI World Exposition) in Seattle, Washington, April 21 - October 21, 1962. The concept of this exhibit was that of a LIBRARY OF THE FUTURE, and in it could be found the latest forms of library service and design, the newer educational media, such as films, microfilms, television, audio devices, including advanced means of storing, retrieving, and communicating bibliographic information. The staffing and dissemination project supported by this contract focused on this new library education setting and assisted in the evaluation of new untried techniques by professional librarians. The LIBRARY 21 Exhibit was staffed by librarians especially trained under this project to work with the public in the interpretation of unique library tools demonstrated by industry. The purposes of the staffing and dissemination project were to provide librarians with an educational experience in a machine-library environment; to explore professional reaction to the introduction of such entirely new concepts; and to evolve valid criteria for the development of advanced library school curricula. This contract provided staff for the Learning Resources Center, Ready Reference Desk, Children's World, and Adult Reading Area as well as other areas where the public had the opportunity to ask questions, use library materials, and interact with machines. Also provided was a program of education and training for the staff at the contractor's School of Librarianship. A prototype Learning Resources Center was also designed and constructed under terms of the contract. This Center included a "quest" space or model study area featuring newer media appropriate for instruction in several subject areas.

The end product of this project is the preparation of a case study which analyzes the educational experience of professional librarians in this new library environment, the feasibility of utilizing the newer educational media for this type of instruction, and drawing of conclusions which will help frame future library programs, select fruitful paths of research, guide the development of library school curricula, and chart the way towards new dimensions in the use of newer educational media in elementary, secondary, and higher education.

Duration: November 16, 1961 to December 31, 1962

Funds Committed: $109,968

Contractor: University of Washington, Seattle 5, Washington

Principal Investigator: Irving Lieberman, Director, School of Librarianship

TABLE OF CONTENTS

Page

Preface.......... i

Digest.......... iii

Section I, General Report, LIBRARY 21 Project.......... 1

Description of the Exhibit.......... 2

Staff Selection Criteria and Method.......... 4

Organization of the Program of Instruction.......... 7

Evaluation of the Program of Instruction.......... 8

Evaluation of the Staff.......... 11

Evaluation of the Exhibit.......... 13

Appendices to Section I

A. Floor Plan of LIBRARY 21 Exhibit.......... 21

B. Advisory Committee for LIBRARY 21 Exhibit and Exhibit Staff Personnel.......... 22

C. Roster of Professional and Non-Professional Exhibit Staff.......... 26

D. Application for Service With LIBRARY 21 Exhibit (form).......... 37

E. Typical Schedule for Program of Education.......... 39

F. Evaluation of LIBRARY 21 Exhibit and Instruction Form (form).......... 40

G. Report of Attendance.......... 45

H. Publicity Samples.......... 46

I. List of Equipment in Learning Resources Center.......... 47

J. Report on Office of Education Contract Funds.......... 48

K. Photographs of the LIBRARY 21 Exhibit.......... 49

Page

Section II. LIBRARY 21 Instructional Program........................ 55

Introduction.. 56

Course Content.. 57

The Professional Challenge of Automation...................... 57

Automation as a Tool in Present-Day Libraries................. 59

Appendices to Section II

A. Syllabus for the Educational Program.................. 62

B. Introduction to Information Retrieval and Librarianship....................................... 68

C. Visual Material in Support of Educational Program.... 77

D. Selected Reading List................................. 112

Section III. Implications of the LIBRARY 21 Exhibit for Library Education.................................... 115

Introduction to Librarianship Curriculum...................... 116

The Technical Services Curriculum............................. 116

Library Service for Children and Youth........................ 117

Administration of Libraries Curriculum........................ 117

Information Science Curriculum................................ 118

SECTION I

GENERAL REPORT, LIBRARY 21 PROJECT

By

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University of California, Riverside

DESCRIPTION OF THE EXHIBIT

Area and Location. The LIBRARY 21 Exhibit occupied some 9,000 square feet of ground space in the Southeast corner of the Washington State Coliseum at the Seattle World's Fair. The usable exhibit area was approximately 6,000 square feet. The remaining area was taken up with pools which set-off the exhibit area beautifully and lent an atmosphere of quiet reflection so often associated with libraries. The entire exhibit was designed by Vance Johnson of Daniel, Mann, Johnson and Mendenhall, Los Angeles firm of architects and engineers. The exhibit was built by the Howard S. Wright Construction Company of Seattle, Washington.

The physical exhibit was designed to provide an educational experience for the general public and staff, an experience in which the Fair visitor might participate either actively or vicariously. Two circular exhibit areas, each 60' in diameter and each surrounded by plexiglass or wood walls 6' high, were connected by a linear walkway. The pools around the exhibit symbolized man's exodus from one continent to another, an early form of communication. A concrete walkway 42' long provided the approach to the North or main entrance to the exhibit.

I.B.M. Alongside the entrance walkway, a symbolic display on the explosion of communication through time was presented in a series of transparent plastic spheres arranged in geometrically increasing numbers. Sponsored by the International Business Machines Company, this portion of the LIBRARY 21 Exhibit started the visitor at the most primitive means of communication, the human mouth and ear, and brought him through time to the present day IBM punched card used in computers. A professional librarian was stationed at the entrance to welcome visitors to the Exhibit, explain that it was a library exhibit, and outline briefly the various parts of the total exhibit.

Sperry Rand Univac. The center and left side of the first circular exhibit area was occupied by a Solid State 90 Computer, supplied by the Univac Division, Sperry Rand Corporation. The central carpeted area provided space for a High Speed Printer and desks where visitors might ask for information from the computer. The outer platform area housed the remaining units of the computer and provided space for the Univac maintenance and service staff members.

The computer display was deliberately simplified for exposure in an exhibit designed for the general public. The Adult Services Division of the American Library Association and Mortimer Adler of the Great Books of the Western World of Encyclopaedia Britannica, Inc., in cooperation with the Univac Division of Sperry Rand Corporation, prepared three kinds of information for storage in the computer: personalized bibliographies created from a store of 8,400 annotated book titles; quotations from 74 authors whose work appears in the Great Books of the Western World; and gazetteer information on 91 "free" nations of the world, supplied by the U.S. Department of Commerce. A professional librarian was on duty in this area to explain the use of computers in library information storage and in library technical processes. Samples of the forms used to obtain information from the computer are included in this report in Appendix C, Section II.

Ready Reference Center. At the right of the main entrance, Encyclopaedia Britannica, Inc. sponsored the Ready Reference Center. This model reference facility was supplied with some 730 selected reference books by their several domestic publishers, and staffed by professional reference librarians. The books were selected by a committee of librarians working with the Reference Services Division of the American Library Association. Teak shelves and reference desk were supplied by NorsCo of Los Angeles, and the Xerox Corporation provided a 914 Copier.

Adult Reading Area. Beyond the reference center, an adult non-fiction browsing collection of books was provided for the Fair visitors, sponsored by the Great Books of the Western World of Encyclopaedia Britannica, Inc. Approximately 800 books, selected by members of the Public Library Association of the American Library Association, were supplied by their several publishers. Plastic jackets were provided for all books by the Demco Library Supplies, Inc. Comfortable lounge furniture was provided by Herman Miller, Inc. In an especially attractive teak display case, a facsimile of the Gutenberg Bible was shown, loaned by Bowdoin College at Brunswick, Maine.

Learning Resources Center. The special needs of students at the secondary level were the concern of the Learning Resources Center, occupying one-half of the second circular display area. This area was planned with the assistance of a committee of the American Association of School Librarians, and was sponsored by the United States Office of Education, through a contract with the University of Washington. The display included a model "quest" space or study carrell designed for individual study. Equipment such as closed-circuit television, telephone, Auto-tutor, and dual-channel tape deck were shown as special supplements to the normal study materials used by individual high school students. Nearby, additional equipment such as the Memo-tutor, microfilm reader-printer, phonograph and radio, as well as Speed Reader, Flash-X, electronic panels, microcard readers, and microfilm reader were displayed. All of this equipment, it was suggested, might be made available in a learning resources center within a school system. Students would be able to use this special equipment as needed to supplement normal book and library resources presently available to them.

Duplicate equipment, arranged on teak shelving, permitted the public to manipulate the various items shown in the display. A professional librarian was available to explain the "quest" space and learning resources center concepts and to answer questions relating to the use of this kind of equipment in schools. A souvenir microcard containing the LIBRARY 21 Exhibit story and reproduction of 48 pages from the Official Guide Book of the Seattle World's Fair was provided by the Microcard Corporation of West Salem, Wisconsin. Over 15,050 cards were distributed to exhibit visitors by the staff. A list of equipment shown in the Center, along with the names of cooperating manufacturers, is given here as Appendix I.

Xerox Theatre. The central portion of the second display circle was occupied by a circular theatre, 32' in diameter, sponsored by the Xerox Corporation. The 39-seat theatre involved a specially designed multiple projector technique to display an eight-minute film entitled "LIBRARY 21", produced by Visualscope, Inc., of New York. Over the period of the Fair, 239,000 persons viewed the film presentation which discussed the historical growth of graphic communication among peoples, outlining the complexities of the present situation, and suggesting the contributions of xerography to the solution of the problem. A brochure, prepared by the Xerox Corporation, was handed to each visitor in the theatre.

R.C.A. and N.C.R. In the remaining portion of the second circular display area, the Radio Corporation of America sponsored a display suggesting a world-wide communication network utilizing satellites for the transmission of documents from one part of the world to another. Nearby, the National Cash Register Company exhibited its recently developed technique called Photochromic Microimages, which stores printed materials on film plates in linear reduction of 200:1.

Children's World. Below the main exhibit level, a room called "The Children's World" was developed by the exhibit designer, Vance Jonson, with the assistance of the Children's Services Division of the American Library Association. The Children's Services Division was responsible for the carefully selected collection of foreign and domestic children's books, provided by their publishers and covered with Brodart plastic jackets and displayed on NorsCo teak shelving. Small tables and chairs from Herman Miller, Inc., gave visiting children and adults an opportunity to inspect and read the books. A small theatre seating 20 children on stools was provided in which the professional librarian on duty told stories, showed special children's movies, or used film-strips. The movies were supplied by Encyclopaedia Britannica Films and the National Film Board of Canada. The film strips were supplied by Weston Woods, Inc.

STAFF SELECTION CRITERIA AND METHOD

Need for Librarians. From the earliest planning stages of the LIBRARY 21 Exhibit, the American Library Association's Advisory Committee felt that the exhibit could be interpreted to the public only through the use of professional librarians. This was especially important in such areas as the Ready Reference Center, the Learning Resources Center, and the Children's World, where the promotion of library use and the interpretation of future developments could be best handled by persons with professional library background. At one time there was discussion of using professional librarians in the Univac area, operating the several units of the computer, and explaining to the public the involvement of computers in library services. The cost of providing professionals in this area proved too high, and the idea was dropped. In retrospect, the use of librarians would have been quite effective and would have avoided much misinformation given to the public by non-professional staff on duty in the Univac area.

U.S. Office of Education Contract. The contract with the Educational Media Branch of the United States Office of Education, Department of Health, Education and Welfare, provided a total of $109,968.00 for several purposes. The breakdown of the contract funds is given here as Appendix J. One of the chief purposes of the contract was to provide staff for the exhibit. Justification for this expenditure of funds was threefold: (1) to provide professional librarians with an educational experience in a machine-library environment; (2) to explore professional reaction to the introduction of entirely new concepts in the library environment; and, (3) to evolve valid criteria for the development of advanced library school curricula.

Number of Staff. In this report, statistics will be given for 84 staff members, excluding the six Encyclopaedia Britannica consultants who were attached to the staff. Of the 84 librarians, 72 were supported from funds provided by the U.S. Office of Education contract with the University of Washington; twelve were supported by Encyclopaedia Britannica, Inc., through the American Library

Association. Our experience indicates that a staff of 144 librarians (exclusive of the Encyclopaedia Britannica consultants) was needed to do the job at the exhibit and demanded by the size of the attendance. Some complaints were received which indicated that not everyone who visited the exhibit received the attention from the staff which they felt was necessary.

Qualifications. Librarians were selected from fifteen states, and one each from Mexico (an American citizen), Germany (USAF personnel), and Canada (a Canadian citizen). With one exception, they had all received degrees from accredited library schools. While their ages were not requested on the application blank or evaluation forms, most of them had received their degrees within the past ten years. The median date of graduation from library school was 1955. On the average, they had had 9.5 years of professional experience, ranging between two and twenty-six years. Their current professional affiliations might be summarized as follows:

36%	Public libraries (including state libraries)
36%	Academic libraries (college and university)
18%	School libraries (all levels)
10%	Special libraries

Sixty percent of the staff received whole or partial financial support from their home institutions in continued pay status. Forty percent used vacation time, compensating time, or leave without pay during their participation in the project. It was hoped that all of the staff would receive continued pay status, but this was not legally possible in a number of cases; in other cases, the head librarians did not feel obligated to provide this support since they had not selected the candidates to represent their libraries.

Travel and Per Diem. The staff received round-trip air coach transportation between their homes and Seattle and $10.00 per diem during their stay in Seattle. Approximately sixty percent of the staff were able to live on the per diem allowance, primarily because inexpensive housing was provided at the University of Washington residence halls and at the Seattle World's Fair special housing facilities. Most of those who did not live within their allowance admitted that they could have done so had they restricted their social and travel activities in the area.

Background. Only twenty-one percent of the staff had ever been affiliated with scientific libraries at any time. This small number had been exposed to current developments in library technology. About one half of the staff had been involved with technology in their own libraries in varying degrees, particularly in the technical processes. With few exceptions they were not involved in or aware of developments in the application of computers to library research, information storage and retrieval, or technical processing operations. The material covered in Dr. Hayes' course was unfamiliar to three-fourths of the librarians. The academic training of most of the librarians had not involved this type of material. Slightly less than half of the staff found the material difficult and expressed the wish that they had had better background training in mathematics.

Method of Selection. Selection, training and administration of the professional staff was the responsibility of the Local Project Director.

Announcement of the impending appointments first went to the professional librarians of the nation in December, 1961, in the "Memo to Members" by David H. Clift in the ALA Bulletin. This was followed by press releases from the office of the Director, School of Librarianship, University of Washington, and from the American Library Association Public Relations Office in Chicago. These appeared in a number of journals available to the profession. Over 2,000 inquiries were received as a result of these announcements. When the Local Project Director was selected and arrived in Seattle in January, 1962, his first major activity was to set up criteria and procedures for selection of the staff. An application blank was prepared (see Appendix D for sample) and mailed to the head librarians of public and academic libraries with book budgets of $50,000.00 or more. Similar distribution was made to selected members of the Special Libraries Association. Copies of the application forms were mailed to all state Departments of Education. In each case, a letter accompanied the application blanks, requesting announcement of the project to interested staff members. By the first week in March 1962, some 1,500 completed applications had been received in the Project Office. Selection of those to be invited to participate was made in March and telegrams inviting the selected librarians were sent out from Seattle on March 13.

Criteria. In view of the fact that this project was not a typical library situation and that possibly several million people would be viewing the exhibit, it seemed important that the librarians selected have several rather specific qualifications. Physical appearance was an important factor, based upon the theory that a majority of visitors would view the staff but might not actually get into conversation with them. The visual impact of persons on duty would be important in the response of the visitors to LIBRARY 21. Academic qualifications were important; all but one of those selected were graduates of accredited library schools. Experience of a rather specific nature was considered. For instance, librarians without experience in children's services were not considered for work in the Children's World. Similarly, it was thought advisable to select librarians with school experience for service in the Learning Resources Center, and librarians with reference background for work in the Ready Reference Center. Another factor considered was the period of availability. Some applicants could come to Seattle only at specific times; some excellent people were not available at the times they could have been used at the exhibit. While no deliberate effort was made to obtain a librarian from every state, attention was paid to geographical distribution of the staff in order to spread the benefits of the program of education as widely as possible. Since the contract proposal was based upon an average of $175.00 per person for round-trip air coach transportation, budget limitations became a most important factor in selection of staff. Higher travel bills of librarians from the East coast had to be balanced by more numerous selection of librarians living closer to Seattle. The application blank requested one letter of reference. These, too, were considered.

Selection. Selection of the staff was difficult. At least seven factors noted above had to be considered for each of more than 1,500 applicants. There were no opportunities for personal interviews, which would have been desireable, and little time to check on additional references. The entire selection process had to be completed within two weeks in order that the candidates would have sufficient time to arrange their affairs and for the Project Office to book airline transportation and arrange for housing and training. A complete roster of those who participated in the course of instruction, including those who served at the exhibit and the substitutes that were used, is available here as Appendix C.

ORGANIZATION OF THE PROGRAM OF INSTRUCTION

Training Groups. In order to secure professional staff members to man the exhibit, it became necessary to arrange for six different groups. The program of instruction for each group lasted five full days; periods of service at the exhibit, following the instruction period, varied from 33 to 40 days, with the longer periods falling in July and August when professional librarians were available for longer periods of time. The six groups were scheduled as follows:

Gp.	Tng. Period	Service Period	Total Days	Regular	Stand-by	Total
1	April 16-20	April 21-May 18	33	15*	10	25
2	May 14-18	May 19-June 15	33	15*	11	26
3	June 11-15	June 16-July 13	33	15*	4	19
4	July 9-13	July 14-Aug. 17	40	15*	3	18
5	August 13-17	Aug. 18-Sept. 21	40	15*	1	16
6	Sept. 17-21	Sept. 22-Oct. 21	35	14*	4	18
	*			89	33	122

* Of the fifteen regular staff members trained in each group, twelve were supported from U.S.O.E. funds under the contract with the University of Washington; the remaining three were supported by Encyclopaedia Britannica, Inc. through the American Library Association. No U.S.O.E. funds were involved in the participation of the three additional staff members.

Instruction. The instruction of the professional staff was undertaken by Dr. Robert M. Hayes of Los Angeles, California, who was attached to the School of Librarianship of the University of Washington. The first five groups of librarians were given instruction on the campus of the University, the sixth group received instruction on the Fair grounds. The first five groups were largely housed at the Men's Residence Halls near the campus; the last group was accommodated in apartments made available to the Project by the Seattle World's Fair Corporation.

Typically, each group met for the first time on Sunday evening prior to the instruction period. In a social gathering and supper at the home of Dr. and Mrs. Irving Lieberman, they had the opportunity to meet each other and Dr. Hayes, and to hear orientation talks by Dr. Lieberman and Mr. Martin.

Facilities. A classroom in the General Engineering Building at the University of Washington was made available to Dr. Hayes and the class for the entire week of the instruction period. Since the librarians in these groups were housed near the campus, it was convenient for them to study on campus. A typical training week schedule is attached to this report as Appendix E. In addition to the full days of classroom work, the groups were given a brief tour of the exhibit, and an orientation tour of the Fair grounds. On two evenings, after class, staff members were asked to report to the exhibit to work with their counterparts in the preceding group. In this way the new staff was filled-in with the details of the exhibit and began to learn the kind of work the staff members were expected to do. On another evening during the week of instruction, those of the preceding group not on duty at the exhibit were invited to sit in with the class for discussion of problems, suggestions for improvement, and comment in general about all aspects of the exhibit and the instruction. These sessions were tape recorded and are available through the American Library Association. Out of the sessions came many ideas for improvement of the administrative detail and operating procedures, as well as some general knowledge about the impact of the exhibit on both the public and the staff members.

As a result of comments from the staff, special supplementary material was provided on teaching machines and the field of programed instruction. Dr. Hayes included a brief summary of the field in his course of instruction, and the staff were encouraged to read additional materials made available to them. These discussions also resulted in improvement and changes in the course of instruction as the training periods grew in number.

Reserve Reading. A collection of books, periodicals and ephemeral materials suggested by Dr. Hayes were placed "on reserve" for the class at the University of Washington Library. Unfortunately, the staff did not have time to read much of the material during their course of instruction, and those who did use the material did so during their period of service at the exhibit. In the final training period, the materials were housed at the exhibit itself and were much more widely used than during the earlier periods of instruction.

EVALUATION OF THE PROGRAM OF INSTRUCTION

In another portion of this report, Dr. Robert M. Hayes presents a summary of the program of instruction and an evaluation from his point of view as the instructor. Since Dr. Hayes was not actually involved in the day-to-day operation of the exhibit, it might be helpful to note the reactions of the staff members themselves.

As is mentioned above, tape recordings were made on five occasions during the six months. The Local Project Director was in daily contact with the staff members during their service at the exhibit. In addition, each staff member was asked to complete a questionnaire at the end of the period of service, giving his reactions to the instruction and to the organization of the exhibit, and his estimation of its impact upon the general public. A copy of this questionnaire is included here as Appendix F.

Purpose of Instruction. One basic problem encountered in the program of instruction arose from the fact that the course was designed to do two quite different things. One purpose was to expose the professional staff to the comprehensive history and present state of the computer art, with some exploration of potential for library operations. It was felt by all concerned that this was an important goal to achieve, so that these staff members might go back to their communities with an awareness of present technology and some willingness to explore possible uses thereof in their own libraries.

A second purpose, less important from the long range point of view, was to instruct the staff for their duties at the exhibit.

In selecting the staff members, the Local Project Director assumed that he was selecting mature, knowledgeable, alert professional librarians. It was also assumed that most of them would bring very little in the way of previous experience or background in data processing to the exhibit. This instruction had to be supplied. Dr. Hayes' course dealt comprehensively with this aspect of the instruction. The instruction on duties at the exhibit was purposefully lighter for several reasons. The primary purpose in having professional librarians in attendance at the exhibit was for public relations - to explain librarianship, library services and facilities, and to encourage the public to become more interested in and to support their local libraries. It was assumed that the librarians chosen would bring this kind of background with them - devotion to and knowledge about librarianship.

Personnel Administration. Since it was impossible to predict with any assurance just what kinds of people might be visiting the exhibit, or what kinds of questions they might ask, the Local Project Director felt that the situation should be structured as little as possible. Assuming staff members were capable and trained in information storage and retrieval, it was hoped that they would develop their personal methods for handling exhibit visitors. During the six months, this method of administration proved successful in most cases. A few of the staff felt frustrated because they were not constantly "supervised" and told exactly what to do. Most of the staff responded to the method with brilliance - developing a public personality and methods of interesting the public in libraries that they had seldom used in present or previous employments.

Adequacy of Instruction. Almost all of the staff felt that the course given by Dr. Hayes had prepared them amply for answering technical questions at the exhibit. Staff working at the Ready Reference Center and in the Learning Resources Center also received questions relating to data processing and computers in libraries, and felt capable of answering them. The librarians serving primarily in the Children's World did not encounter many such questions and thus were not in a position to make much use of the instruction while on duty at the exhibit.

Learning Resources Center Problems. The late development of the Learning Resources Center caused a number of problems, some related to the course of instruction. The full equipment for the Center did not arrive prior to opening on April 21 and therefore it was impossible to provide "on site" instruction for the staff. They responded to the difficulties with great good humor and within a short period of time had the situation in hand. Subsequent groups were provided with printed materials describing the various items of equipment and the purposes to which they could be put. The information was not always adequate, and seldom was there available any technical literature. The equipment was not under maintenance contract, so it became necessary for the staff to develop skills in simple maintenance. Without adequate technical data, this was extremely difficult. In a short period of time, several of the non-professional attendants were trained in maintenance of the equipment and did as well as they could to keep it operating. The professional librarians many times felt inadequately trained on specific equipment. While improvements were made during the course of the fair, this was perhaps the weakest portion of the program of instruction. In an attempt to prevent professional staff members from becoming mechanics and electricians, the Local Project Director may have erred in not incorporating more technical discourse into the lectures and on site instruction.

Most of the staff did acquire this knowledge on the job; a few did not adjust to the situation.

Children's World. The staff of the Children's World were carefully selected with adequate background in this type of service. It was hoped that they would also be good story-tellers. Many of them were, but not all. With the multiple choices of story, slide-film, and motion pictures to supplement book-talks and conversation with children and adults, this staff did very well indeed. For a part of the six months, Mrs. Elizabeth S. Margulis of Santa Fe, New Mexico, an experienced children's librarian, acted as coordinator for this area of the exhibit. Programs were established and a somewhat flexible routine developed. It was felt here, as well as in other areas of the exhibit, that the best could be obtained from the staff if they were permitted the greatest amount of freedom in organizing their work. Other than to set the framework within which all portions of the exhibit operated, the Local Project Director did not structure the work in any area. He permitted the staff to feel their way, adjusting the program to suit the needs of any particular audience and varying the program depending upon the pressure of attendance and the talents of the librarians on duty.

Ready Reference Center. In the Ready Reference Center, the staff had been selected with some reference service background. While the staff was expected to be ready and able to answer questions from the public, this turned out to be only a portion of the work load. The staff here, as well as elsewhere in the exhibit, were actually doing public relations work. About 100 questions a day were answered. The collection of reference books was adequate to handle most questions. A larger part of the activity in the Center, however, involved conversations with the public, urging consideration of community library facilities, interesting young people in librarianship as a career, and discussing all manner of library services with those who stopped to talk.

Interpretation. Another function of the staff that became necessary as the Fair proceeded was that of explaining the exhibit to the public. Standing by itself, the exhibit was not self-explanatory. The combination of Univac computer with books, the part of teaching machines in the library environment, and the relationship of the satellite communication and photochromic microimages to normal present-day library services was not apparent. It became clear to the visitors only in conversation with the staff. The existence of a staff at this exhibit was of extreme importance to the public understanding of what the exhibit was about.

In preparation for this function, the staff was provided with a number of press releases on the project, indicating the thinking behind the organization of the exhibit and the purposes of the several sections. The Local Project Director as well as the Chairman of the Advisory Committee, attempted to fill the staff in on the basic history of the exhibit planning and the ideas behind it. This work was done outside the classroom in order to leave the maximum amount of time available to Dr. Hayes for the completion of his coursework.

Staff Reaction. From the comments of the staff, one gathers that the Hayes course opened vistas regarding the possible application of mechanization and electronic devices to library work. Most of the staff stated that they had lost their fear of automation in libraries, and did not feel that they would be replaced by machines or computers. They had acquired an appreciation of the use of machines in certain specific areas to relieve human beings of drudgery and to leave more time for the creative, professional aspects of library work. While some of the staff mentioned the possible handicap of lack of money, they could visualize great strides in library development involving the utilization of computers and other devices for storage and retrieval of information. Most of the staff realized that this type of mechanization is intended to supplement and augment existing library services, not to replace the production and reading of books. They also realized that the programing of computers and teaching machines must necessarily be done by human beings - that these devices will very likely result in an increase in human employment, not the replacement of humans by machines.

Academic Training. Almost all of the staff indicated that they felt that library schools should include courses along the lines of Dr. Hayes' presentation; at least basic courses in information storage and retrieval should be included in every library school curricula. In addition, they hoped that the library schools would increase their coverage of information on other mechanical devices that might be used in library operations. They suggested that the schools include some work on public relations. The experience they had at the exhibit, entirely new as compared with their normal occupations, caused them to appreciate the need for sharper public relations in libraries - going out to the public and promoting the library's services, rather than waiting for a curious or interested person to wander into the library.

Self-criticism. In their self-analysis on the evaluation reports, five of the staff felt that they were not "aggressive enough," that they had failed to go out to the visitors. A number of others specifically mentioned their distaste for the use of public address systems in the exhibit. The systems became necessary when it was observed that the small staff could not meet and talk with a large enough portion of the visitors to make the full impact felt. The public address system at the entrance was used to offer general greetings to incoming visitors and to outline for them the various portions of the exhibit. When the Learning Resources Center was revised, a second public address system was installed so that the single librarian on duty could reach a larger number of people. While most of the staff were unaccustomed to the use of public address systems, and many felt that they did not use them well, these devices were most important in reaching crowds with the story of the exhibit.

EVALUATION OF THE STAFF

Limitations. The selection of the staff was made from among applications submitted; it was obvious that many, many excellent librarians did not submit applications for one reason or another. Secondly, the choices were made in a very short period of time, with limited amounts of information, and with no opportunity for personal interviews. References were frequently inadequate and certainly insufficient in number. Despite these handicaps, a staff of 84 excellent librarians was selected.

Staff Performance. The proper evaluation of staff performance could only be made after long and expensive research investigation, for the real impact they may have had on the public is not presently ascertainable. The project received many, many unsolicited compliments on various staff members. The majority of the staff performed in a manner far exceeding any reasonable expectation. Considering that they had never been in a situation quite like this before, meeting hundreds and hundreds of people each day, expected to be carefully groomed, cheerful, and bubbling with enthusiasm after hours of standing on concrete floors, having to eat hurried meals (they were allowed only one half hour each for lunch or supper), and having to cope with unfamiliar residence facilities, bus transportation, and an environment often strange and unfamiliar, they became public relations experts, showing the modern librarian to the best advantage.

Effects of the Instruction. As a result of their instruction under Dr. Hayes, and their experience in talking with hundreds of people at the exhibit, the staff lost much if not all of its apprehensions concerning automation. They became enthusiastic realists about the possible utilization of mechanization in routine library operations. They began to acquire foresight in anticipating the expansion of information storage and retrieval centers associated with libraries, the organization of learning resources centers in school systems, and some of the staff could even foresee the possible utilization in homes of electronic resource networks. As one of the staff put it, "The facilities and 'know-how' for this kind of library world are already available; what is needed is public acceptance by administrators and librarians."

Reaction of Professional Librarians. Again, from comments of the staff and from reported comments from librarians visiting the exhibit, it appears that a number of professional librarians are not fully convinced about the place of automation in libraries. They frequently indicated apprehensions about the encroachment of machines, assuming that their jobs will be in jeopardy as a result. One outcome of the exhibit was a strongly felt need for education of professional librarians and teachers. Information, correctly presented, appears to be seriously needed. The fact that 84 librarians, most without background in data processing, could come out of the exhibit experience having lost their apprehensions is ample proof of the efficacy of the project program.

Librarians at a Fair. Only one of the staff had any question that professional librarians should be doing service at a World's Fair exhibit. In general, the staff reflected their acknowledgment that none but trained librarians could have done the job. The one dissenter appeared to question the efficiency of this particular type of public relations work. All of the others encouraged the American Library Association to continue such exhibits, improving each one, and making use of the extensive experience gained in Seattle. Many felt that it is only in this kind of an exhibit that the general population could be interested in using library services and in promoting their improvement.

Library Image. One of the aspects of staff selection that was in the minds of all concerned was the desire to improve upon the public image of the professional librarian. It was accepted that the present image is not a favorable one. The stereotype of the librarian is too firmly fixed in the public mind to be dislodged by a single World's Fair exhibit. But an effort was made to select for the staff individuals who were at least pleasant in appearance, who dressed reasonably well, who were outgoing, cheerful, friendly people. The visitors to the exhibit were sometimes amazed to learn that various staff members were professional librarians. They were equally amazed to find males among professional librarians. Among the exhibits of a notably friendly Fair, LIBRARY 21 was especially renowned for its friendly staff. Visitors often expressed their appreciation for this fact and recommended the exhibit to friends and neighbors. Much of the 1.8 million attendance achieved by the exhibit can be traced to the efforts of the staff in promoting the feeling of cheerful friendliness. If it can be said that the public image of the librarian has been improved, the credit should properly go to the excellent librarians of the LIBRARY 21 Exhibit staff.

Summary. In summary, one might say these things about the staff:

1. A majority of the staff were eminently well suited to the task and performed above any reasonable expectation.

2. Most of the staff benefited greatly from the course of instruction, became realists about automation and mechanization in libraries, and developed great enthusiasm for promoting such devices in their own libraries.

3. Because of their own conscious efforts, the staff has improved the public image of professional librarians, at least among the 1.8 million who visited the LIBRARY 21 Exhibit.

4. The staff came to realize some of the deficiencies of their own academic library training and had many suggestions to offer about improvement of library school curricula.

5. Many of the staff have been asked to speak to various groups in their home areas following their return from Seattle. The influence that these specially trained, enthusiastic librarians will have cannot be assessed precisely, but the potential is large.

EVALUATION OF THE EXHIBIT

General Comment. Public comment on the exhibit was profuse and generally favorable. Many individuals took the trouble to say that they thought the exhibit was the best looking, best designed exhibit at the Fair. The creativity of the designer, Vance Jonson, was commended by everyone. For those who worked with the exhibit over the full six months, the feeling continued to be one of gratification and pride. The exhibit wore well over a period of time.

Children's World. The most frequently heard comment concerned the Children's World. While it was located below the main floor of the exhibit and was limited in capacity, it was a delight to staff and visitors alike. Children especially enjoyed it and the adults were charmed. The programs given there were uniformly well received and the talented children's librarians on duty did much to improve the public image of the librarian. The maze, through which everyone entered the area, was a source of constant interest to young and old alike. Its message brought people into the book area in a positive, amused frame of mind. It was relatively easy, then, for the staff to present programs to receptive audiences. Probably more than any other area of the exhibit, the Children's World resembled library services best known to the visitors.

Ready Reference Center. The second area most favorably commented upon was the Ready Reference Center. Many visitors were notably pleased to see books in the exhibit, and were happy to talk with professional librarians. They did not often have questions in mind, not expecting to be able to find the answers at a World's Fair. Those who did stop at the desk were impressed by the book collection, the staff, and especially the Xerox 914 Copier, with which the staff provided visitors with copies of the answers to their reference questions. Many visitors were made aware of ordinary library services for the first time as a result of their visit to LIBRARY 21. It would be interesting to know if this alchemy results in increased use of public libraries across the nation.

Univac. The Sperry Rand Univac computer was, of course, a focal point for the entire exhibit. There is no question that it attracted many visitors to LIBRARY 21. There was occasional criticism of the programing of the computer, some dissatisfaction with the slowness of delivery of the print-out, and some unhappiness from the visitors about the titles provided on the personalized bibliographies. The librarian stationed at the Univac High Speed Printer was in a position to explain these apparent difficulties. Whenever contact was made with visitors, the criticism seemed to disappear. Explanation was made that this part of the LIBRARY 21 display was not intended to be a working library, but an exhibit for the general public. The information programed for the computer was deliberately simplified for use in an exhibit. The quality of the bibliographies produced by the computer was hardly the fault of the mechanism. Librarians selected the titles programed; any inadequacies of the lists were properly the fault of the programing, not the machine. The limited number of book titles (8,400) programed for the computer was in itself a handicap. A number of the bibliographies produced from this limited resource included only one to three titles, considered inadequate by some visitors. Lack of time and funds prevented the programing of a larger number of book titles. Very likely a number between 25,000 and 50,000 should have been used in order to provide satisfactory bibliographies in all possible areas. Also, the slowness in producing print-out at times was again the fault of programing, not the machine.

The large number of commendations from visitors appeared to justify the planning of those involved with the Univac. The fact that untrained, lay visitors could actually participate in a computer operation was a source of amazement and pleasure. It is unlikely that an exhibit exposing to public view the operation of a normal research project utilizing computers would have had as much public interest or acceptance as the type of program at LIBRARY 21. It was not proposed for experts, but rather to inform the general public, many of whom had never seen a computer before, much less seen one operate. The fact that 84,000 print-out forms were given out in six months and that personal contact was made by librarians with many of the visitors, would seem to justify the program as presented.

Furnishings. The furnishings of the exhibit received warm and enthusiastic comments. A number of visitors were heard to remark about the design and comfort of the Herman Miller lounge furniture; many inquired about the handsome teak shelving and furniture from NorsCo.

"LIBRARY 21" Film. In the six months period, over 239,000 persons saw the "LIBRARY 21" film in the Xerox Theatre. Many viewers, among them such notables as Robert Maynard Hutchins and James Hoffa, commented most favorably on the imagination of the film covering the history and future prospects of graphic communication. Many simply enjoyed eight minutes of rest in handsome, comfortable chairs.

General Design. The circular design of the exhibit appeard to afford the ultimate in freedom for the visitor to roam, providing no constriction in his progress from one area to another. The design enabled the exhibit to accommodate large numbers of people at one time. The average hourly attendance was well over 1,000 and at no time did the exhibit appear to be excessively crowded. The Xerox Theatre, of course, was limited in capacity to 39; shows were given about every fifteen minutes during the day, with light attendance before 11:00 a.m. and after 9:00 p.m. The Children's World was limited, too, to forty persons. The flexible nature of the programs there allowed a constantly changing audience.

The staff members in attendance at the Ready Reference Center desks handled the crowds adequately in most cases. One professional was originally stationed at the Adult Reading Area to offer readers' advisory service and to promote libraries in general. After the exhibit was in operation for some weeks, it became obvious that identification and explanation of the whole exhibit was more important. The professional was moved to the entry way and a public address system installed so that larger numbers could be reached. Another professional was stationed at the Univac High Speed Printer to explain the use of computers in library operations. One staff member, plus assistance from non-professional attendants, manned the Learning Resources Center. This was almost always inadequately staffed; the crowds were always heavy and the interest of the public quite intense. It was impossible for one person to contact all the interested visitors, even with assistance of a public address system. The area would have been better served with two or even three professionals on duty during most hours of the day and evening.

Design Problems. While the LIBRARY 21 design was inspired aesthetically, it did provide a number of administrative problems The fact that there were not one but three entrance-exits compounded public confusion. The North, or main entrance-exit was fairly well identified and the visitor entering at this point was provided with an introduction to the entire exhibit. The visitor entering the West entrance, saw only a staircase (to the Children's World) and a huge circular structure clearly identified with the Xerox name. There was inadequate identification of the American Library Association. The attendants stationed there attempted to fill-in with verbal suggestions to visitors, but were unable to reach all the people flowing into the exhibit at this point. The West entrance was also used as an exit by many visitors who, having entered at the North, walked around half the first circle, looked down into the Children's World, and departed without having been aware of the rest of the exhibit. At this point, too, two short steps made of material close in color to that of the main Coliseum floor, caused many people to fall. Toward the end of the Fair, when the average age of the visitors increased sharply, accidents were even more frequent.

The South, or rear exit, fortunately built as a ramp, was originally thought to be the least important exit and never as an entrance. It developed that almost as many visitors entered the exhibit at this point as entered from the North. The reason was the close proximity of the public rest rooms at the Southeast corner of the Coliseum. Visitors entering here were inadequately informed about the nature of the exhibit, its sponsor, and they were not clear about the direction in which they should walk to view the exhibit. Many were never aware of the first circle at the front of the exhibit and missed it entirely.

With three entrance-exits, it was almost impossible to tabulate the number of visitors at the exhibit. This was attempted on two occasions for a full week; once in July, once in September. The attendants counted each visitor entering the exhibit. The results of these tabulations are given in Appendix G. It will be seen that the count in each sample week was consistent and that the exhibit received approximately 18% of each day's total Fair attendance. It is assumed from these sample weeks that approximately 1.8 million people visited the exhibit during the six months.

In the opinion of many of the staff members, the traffic pattern could have been improved by providing a clear path for the visitor to follow in order to see the entire exhibit. One entrance and one exit would have eliminated much confusion. A reduction in commercial identification, as was originally planned, and a greater emphasis on the sponsorship by the American Library Association would also have reduced confusion and would have been greatly appreciated by the staff.

Identification. Many of the staff members suggested increased numbers of signs - directional, explanatory, invitational signs that would clearly identify the areas of the exhibit and explain their relationship to each other. While there is certainly some question about the willingness of the public to read signs, it was obvious that the areas of the exhibit were inadequately identified and many visitors did not understand the interrelationship of the parts of the exhibit until it was explained to them by a staff member.

Basement Area. The location of the Children's World in a basement room was inadvisable from an operational point of view. The Children's World was one of the most popular areas of the entire exhibit. The single staircase, providing both access and egress, lent confusion in traffic flow and required the constant vigilance of an attendant. The stairs were hazardous to elderly visitors and teen-age girls in high heels. The constant flow of traffic up and down the stairs proved a distraction, audible and visual, from the programs in progress.

Communication. The noise level inside the Coliseum was constant and annoying - several television speakers adjacent to the exhibit were constantly blaring voices and music; it was almost impossible at times for the staff to communicate with visitors in normal vocal levels. The exhibit would have been improved by the installation of a comprehensive sound system, using taped or live announcements. Communication was always a problem within the exhibit and many people did not get the message of the exhibit because it was impossible to reach all of the thousands of visitors with the facilities and personnel available.

Publicity. From December, 1961 to the opening of the Fair in April, 1962, newspapers over the country printed material provided by the American Library Association public relations staff on LIBRARY 21. During the period of the Fair, the exhibit was frequently the subject of individual stories in newspapers and journals, various members of the staff were interviewed for radio and television programs, and the exhibit was often included in general press releases from the Seattle World's Fair Press Department.

Within the exhibit itself, a number of publicity items were available to visitors. The American Library Association, in cooperation with a number of the exhibit's sponsors, produced a six-page illustrated brochure showing all areas of the exhibit and listing all participating sponsors. These brochures were reproduced at the Seattle Public Library. Approximately 150,000 were distributed. The Microcard Corporation of West Salem, Wisconsin, provided 15,050 souvenir microcards containing a photograph of the exhibit, a two-page story on LIBRARY 21 by Joseph Becker, the Project Coordinator, and reproduction of 48 pages from the Official Guide Book of the Fair. The Xerox Corporation also provided a brochure entitled "LIBRARY 21," covering the film shown in the Xerox Theatre and the contribution of xerography to graphic communication. Over 200,000 Xerox brochures were distributed. Through the cooperation of the New York Life Insurance Company, 100,000 copies of the twelve-page brochure, "Should You be a Librarian?" by Edward G. Freehafer of the New York Public Library, were made available for distribution at the exhibit. Samples of these four items are included here as Appendix H.

On October 2, Library Day was held at the Fair, sponsored by the Washington Library Association and the Washington State School Library Association. The morning session was opened by Ewen C. Dingwall, General Manager of the Seattle World's Fair, followed by a talk by David H. Clift, Executive Director of the American Library Association. The principal speaker was Madame Braj Kumar Nehru, wife of the Indian Ambassador to the United States. Several hundred high school library assistants attended the day's activities. After the morning session, the students toured the foreign exhibits and the LIBRARY 21 Exhibit in the Coliseum. During the afternoon session, they met and talked with over twenty Washington State authors, especially invited for the event.

Mrs. Carolyn Field, then a member of the LIBRARY 21 staff, organized a storytelling festival for children at the Fair on October 13. The event was held in the United Nations pavilion. Throughout the day, personnel from the various foreign exhibits at the Fair came to tell children's stories from their native lands.

During the opening week of the Fair, the NBC daily "Today" show, with John Chancellor as host, appeared at a number of locations around the grounds. A sequence of some twelve minutes was taped at the LIBRARY 21 exhibit and broadcast nationally on April 26. Mr. Alphonse F. Trezza, Associate Executive Director of the American Library Association, guided the television personalities through the library exhibit. Public response to the program was most gratifying.

While local newspapers and radio and television studios were very cooperative, it was found very difficult to produce a steady stream of news releases on LIBRARY 21 with the limited staff available. Publicity sent out from the Chicago headquarters of the Association received attention in the nation's press, but items released by the Seattle World's Fair were given greater play. Much more publicity could have been secured for the exhibit had their been on the staff a trained public relations member.

Learning Resources Center. The design of the Learning Resources Center was a complicated problem. Because of the lateness of the contract with the University of Washington under which this area was developed, the exhibit designer, Vance Jonson, had to relegate a portion of the design to others. The original concept of four "quest spaces," one each concentrating on humanities or language arts, science, social science, and the fine arts, was attempted when the exhibit opened in April. The designer used some twenty-two booths manufactured by Electronic Teaching Laboratories, upon which various equipment was placed. Small signs were developed to explain the equipment and its purpose. The booths, though perfectly adequate for individual study in a school or library situation, proved unsuitable for a Fair exhibit. They used up much of the 1,000 square feel of exhibit space, leaving very little for visitors or staff. Ideally, only one person seated at each booth could operate or even observe the equipment in operation. The graphics were totally inadequate in explaining the organization of a learning resources center.

After it became obvious that the design was inadequate, attempts were made to revise it. Enlisting the generous assistance and knowledge of Miss Patricia Foster of the Bellevue (Washington) Schools, and the artistic assistance of Evert Sodergren of Seattle, the entire area was revised. A single "quest" space was developed, concentrating on the language arts. A dual-channel tape deck using French language tape, an Auto-tutor using a film on punctuation developed by U.S. Industries, a loop projector to simulate closed-circuit television used a special film made up of eight clips from Encyclopaedia Britannica Films, Inc. films, and the Themac programed learning book on French made up the study space equipment. Nearby, a Memo-tutor used cards on art recognition and was demonstrated as part of the presentation. The Filmac 300 microfilm reader-printer, supplied by Minnesota Mining and Manufacturing Company, was used to demonstrate information storage on microfilm and the tie-in with research by high school students. A public address system was installed so that the librarian giving the presentation could reach approximately 100 persons without disturbing the Xerox Theatre nearby. At the conclusion of each showing in the Xerox Theatre, the librarian would begin to explain the learning resources center concept and the idea of a "quest" space for individual study. At the conclusion of this ten-minute presentation, the public were invited to visit the remaining portion of the Center, where duplicate equipment was available for them to operate and inspect at close range. The duplicate equipment was placed on teak shelving at eye-level. This arrangement did away with chairs, permitting larger numbers of visitors to see the equipment clearly, and discouraging individual visitors from monopolizing pieces of equipment. A very large number of visitors could be accommodated satisfactorily in this manner.

The explanatory signs were enlarged to four times their original size so that visitors could read them at some distance. The association of the equipment in the Learning Resources Center to the individual study or "quest" space was explained by the staff member on duty. During the latter months of the Fair, the Center became quite effective and received many favorable comments from visitors.

Maintenance. Maintenance of the equipment at the exhibit was a grave problem. Most of the equipment, with the exception of the Univac, was not provided with any regular maintenance service by contract. While it was theoretically possible to call in repairmen for service on the Xerox 914 Copier and the Filmac 300 Microfilm Reader-Printer, necessary delays worked a handicap. Visitors at an exhibit do not understand non-operating equipment and became impatient with attempted explanations. Neither the American Library Association nor the individual industrial sponsors benefited from equipment out of operation for days at a time. The total effectiveness of the exhibit was diminished by numerous operational failures.

In the case of the equipment shown in the Learning Resources Center, it was discovered that a majority of the equipment could not withstand the usage of hundreds of people or operate continuously during the 84 to 91 hours each week for six months. After three months, it became necessary to obtain replacement for most of the equipment in order to reduce "down time" at the exhibit. It might have been wiser to plan originally for complete duplicate equipment for instant replacement in case of break-down, thus avoiding embarrassment for the staff and gaps in the display. The non-professional attendants became quite adept at minor repairs, but could not undertake the extensive repairs that were often necessary.

Summary. The enumeration of trouble spots in this report is intended to be of some assistance to those who may be involved in planning future exhibits. They do not diminish the very real achievement of the American Library Association in sponsoring a highly successful public exhibit. All of the members of the staff, professional and non-professional alike, felt great pride in being associated with a distinguished exhibit. The design concept was both inspired and continuously interesting. Over the six months period, LIBRARY 21 attracted an extraordinary number of visitors. Many young people became interested in library work as a career after having seen the exhibit and talked with members of the staff. Many other visitors became inspired to improve their community library services and facilities. Numerous professional librarians learned a great deal about the possible uses of electronic and mechanical devices in library operations. Finally, there are now eighty-four trained professional librarians at their posts about the country who benefited by an extraordinarily well organized program of education on data processing and computers. These librarians are now speaking frequently to many groups. Their influence can be important in the future development of library services in this country.

LIST OF APPENDICES

A. Floor Plan of LIBRARY 21 Exhibit

B. Advisory Committee for LIBRARY 21 Exhibit and Exhibit Staff Personnel

C. Roster of Professional and Non-Professional Staff

D. Application for Service with LIBRARY 21 Exhibit

E. Typical Schedule for Program of Education

F. Evaluation of LIBRARY 21 Exhibit and Instruction Form

G. Report on Attendance

H. Publicity Samples

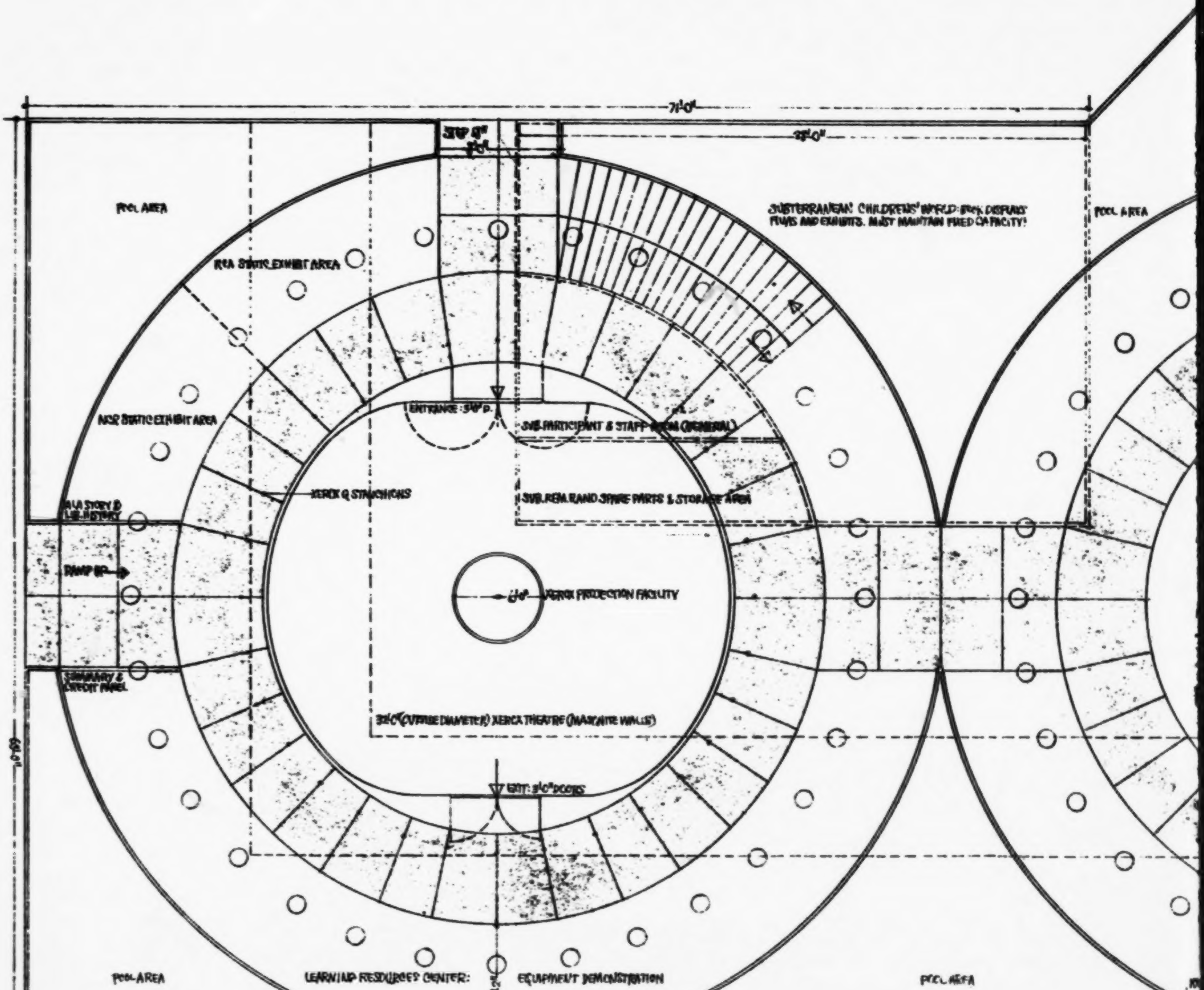
I. List of Equipment in Learning Resources Center

J. Report on Office of Education Contract Funds

K. Photographs of LIBRARY 21 Exhibit

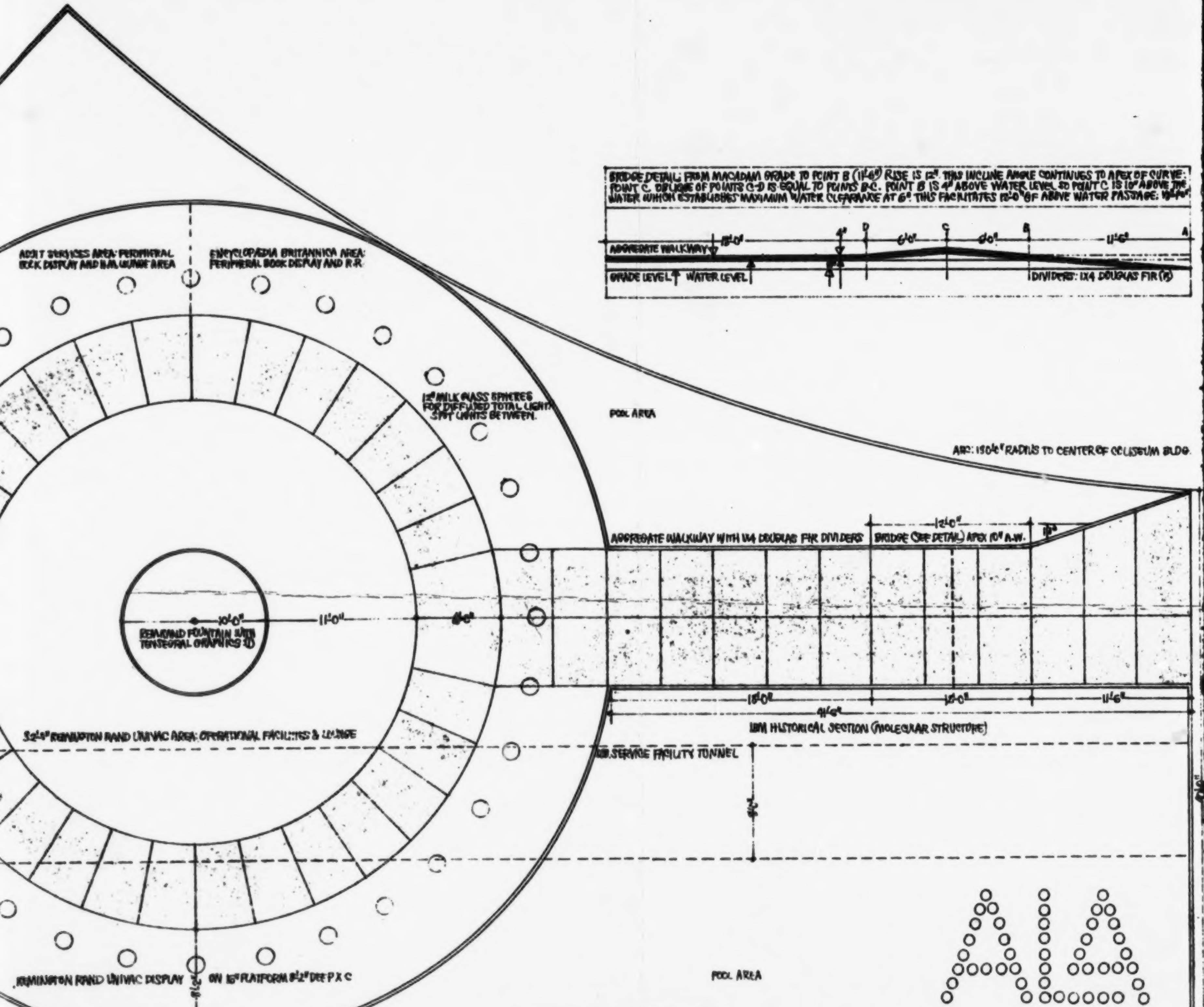
APPENDIX

FLOOR PLAN OF


71'-0"
23'-0"
STEP 8"
POOL AREA
RCA STATIC EXHIBIT AREA
NCR STATIC EXHIBIT AREA
SUBTERRANEAN: CHILDRENS' WORLD: BOOK DISPLAYS FILMS AND EXHIBITS. MUST MAINTAIN FIXED CAPACITY!
POOL AREA
ENTRANCE: 3'-0" D.
SUB-PARTICIPANT & STAFF ROOM (GENERAL)
XEROX Q STANCHIONS
SUB. REM. RAND SPARE PARTS & STORAGE AREA
3M STORY & LIB. HISTORY
RAMP UP
XEROX PROJECTION FACILITY
SUMMARY & CREDIT PANEL
31'-0" (OUTSIDE DIAMETER) XEROX THEATRE (MASONITE WALLS)
EXIT: 3'-0" DOORS
68'-0"
POOL AREA
LEARNING RESOURCES CENTER:
EQUIPMENT DEMONSTRATION
POOL AREA
31'-2"
39'-5½"
102'-0"

A TO SECTION 1

F LIBRARY 21 EXHIBIT


BRIDGE DETAIL: FROM MACADAM GRADE TO POINT B (11'-6") RISE IS 12". THIS INCLINE ANGLE CONTINUES TO APEX OF CURVE: POINT C. OBLIQUE OF POINTS C-D IS EQUAL TO POINTS B-C. POINT B IS 4" ABOVE WATER LEVEL SO POINT C IS 10" ABOVE THE WATER WHICH ESTABLISHES MAXIMUM WATER CLEARANCE AT 6". THIS FACILITATES 12'-0" OF ABOVE WATER PASSAGE.
AGGREGATE WALKWAY
GRADE LEVEL
WATER LEVEL
DIVIDERS: 1X4 DOUGLAS FIR
A
B
C
D
15'-0"
4"
6'-0"
6'-0"
11'-6"
ADULT SERVICES AREA: PERIPHERAL BOOK DISPLAY AND B.M. LOUNGE AREA
ENCYCLOPAEDIA BRITANNICA AREA: PERIPHERAL BOOK DISPLAY AND R.R.
12" MILK GLASS SPHERES FOR DIFFUSED TOTAL LIGHT SPOT LIGHTS BETWEEN.
POOL AREA
ARC: 150'-0" RADIUS TO CENTER OF COLISEUM BLDG.
AGGREGATE WALKWAY WITH 1X4 DOUGLAS FIR DIVIDERS
BRIDGE (SEE DETAIL) APEX 10" A.W.
12'-0"
10'-0"
11'-0"
6'-0"
REMINGTON RAND FOUNTAIN WITH TENSEGRAL GRAPHICS
15'-0"
12'-0"
11'-6"
41'-6"
IBM HISTORICAL SECTION (MOLECULAR STRUCTURE)
32'-6" REMINGTON RAND UNIVAC AREA: OPERATIONAL FACILITIES & LOUNGE
IBM SERVICE FACILITY TUNNEL
REMINGTON RAND UNIVAC DISPLAY ON 18" PLATFORM 8'-2" DEEP X C
POOL AREA
4" CONCRETE RETAINING WALL 12" ABOVE GRADE
71'-10½"
AIA

APPENDIX B TO SECTION I

ADVISORY COMMITTEE FOR LIBRARY 21 EXHIBIT AND EXHIBIT STAFF PERSONNEL

ADVISORY COMMITTEE FOR THE LIBRARY 21 EXHIBIT.

Dr. Burton Adkinson, National Science Foundation, Washington, D.C.

Mrs. Frances Neel Cheney, Library School, George Peabody College of Teachers, Nashville Tennessee.

Mr. Emerson Greenaway, Philadelphia Free Library, Philadelphia, Pennsylvania.

Miss Katharine Harris, Detroit Public Library, Detroit, Michigan.

Dr. Robert M. Hayes, Advanced Information Systems Company, Los Angeles, California.

Mr. Marion A. Milczewski, University of Washington Libraries, Seattle, Washington.

Mr. Foster E. Mohrhardt, National Agricultural Library, Washington, D.C.

Mr. Andre S. Nielsen, Evanston Public Library, Evanston, Illinois.

Mr. Bernard Poll, King County Public Library, Seattle, Washington.

Miss Maryan E. Reynolds, Washington State Library, Olympia, Washington.

Mr. Francis R. St. John, Brooklyn Public Library, Brooklyn, New York.

Dr. Ralph R. Shaw, Graduate School of Library Service, Rutgers University, New Brunswick, New Jersey.

Dr. Mortimer Taube, Documentation, Inc., Washington, D.C.

Mrs. June T. Thurston, Washington Library Association, Yakima, Washington.

Miss Carolyn I. Whitenack, Purdue University, West Lafayette, Indiana.

Mr. Willard O. Youngs, Seattle Public Library, Seattle, Washington.

Dr. Irving Lieberman, School of Librarianship, University of Washington, Seattle, Washington, Chairman.

PROJECT COORDINATOR.

Mr. Joseph Becker, 5805 Marbury Road, Bethesda 14, Maryland.

AMERICAN LIBRARY ASSOCIATION LIAISON OFFICER.

Mr. Alphonse F. Trezza, Associate Executive Director, American Library Association, Chicago 11, Illinois.

LOCAL PROJECT DIRECTOR.

Mr. Gordon P. Martin, University Library, University of California, Riverside, California

PROJECT INSTRUCTOR.

Dr. Robert M. Hayes, Advanced Information Systems Company, Los Angeles, California.

PROJECT DESIGNER.

Mr. Vance Jonson, 6444 Oakdale Avenue, Woodland Hills, California

ARCHITECTS AND ENGINEERS.

Daniel, Mann, Johnson & Mendenhall, Los Angeles, California.

ADVISORY COMMITTEE FOR THE LEARNING RESOURCES CENTER.

Miss Eleanor E. Ahlers, Office of Superintendent of Public Instruction, Olympia, Washington. (A.A.S.L. Representative)

Dr. John Amend, Pacific Lutheran University, Parkland, Washington.

Dr. Chester Babcock, Office of Superintendent of Public Instruction, Olympia, Washington.

Mr. Louis Bruno, Office of Superintendent of Public Instruction, Olympia, Washington.

Miss Patricia Foster, Bellevue Schools, Bellevue, Washington.

Mr. Ross Glover, Bellingham Public Schools, Bellingham, Washington.

Dr. Gordon Lee, College of Education, University of Washington, Seattle, Washington.

Dr. Irving Lieberman, School of Librarianship, University of Washington, Seattle, Washington.

Mrs. Mary Wark, Office of Superintendent of Public Instruction, Olympia, Washington.

CONSULTANT, LEARNING RESOURCES CENTER.

Miss Patricia Foster, Bellevue Schools, Bellevue, Washington.

ADULT SERVICES DIVISION ADVISORY COMMITTEE FOR THE AUTOMATED ELECTRONIC LIBRARY.

Kenneth F. Duchac, Library Extension Division, Maryland State Department of Education, Baltimore, Maryland.

Robert S. Ake, Enoch Pratt Free Library, Baltimore, Maryland.

Mrs. Mary A. Dulaney, Montgomery County Department of Public Libraries, Gaithersburg, Maryland.

Norman Finkler, Free Library, Philadelphia, Pennsylvania.

Mary C. Hatch, Public Library, New York, New York.

Helen Ransom, Edison Branch Public Library, Detroit, Michigan.

Dorothy Sinclair, Enoch Pratt Free Library, Baltimore, Maryland.

Mrs. Eleanor T. Smith, Public Library, Brooklyn, New York.

Eleanor Phinney, ALA Staff Liaison, Chicago, Illinois.

MANAGER, SPERRY RAND UNIVAC EXHIBIT.

Mr. Ralph Sackman, Jr., Univac Division, Sperry Rand Corporation, Seattle, Washington.

CHILDREN'S SERVICES DIVISION ADVISORY COMMITTEE FOR THE CHILDREN'S WORLD.

Mrs. Carolyn W. Field, Free Library, Philadelphia, Pennsylvania.

Mrs. Augusta Baker, Public Library, New York, New York.

Jane Darrah, Public Library, Seattle, Washington.

Rosemary Livsey, Public Library, Los Angeles, California.

Virginia Haviland, Public Library, Boston, Massachusetts.

Anne Izard, Westchester Library System, Mount Vernon, New York.

Barbara S. Moody, Enoch Pratt Free Library, Baltimore, Maryland.

Jean A. Merrill, Public Library, Kansas City, Missouri.

Mildred L. Batchelder, ALA Staff Liaison, Chicago, Illinois.

I-B-4

COORDINATOR, CHILDREN'S WORLD.

Mrs. Elizabeth S. Margulis, Santa Fe, New Mexico.

PUBLIC LIBRARY ASSOCIATION ADVISORY COMMITTEE FOR THE ADULT READING AREA.

John S. Richards, The Tamarack, Mercer Island, Washington.

Eleanor A. Ferguson, ALA Staff Liaison, Chicago, Illinois.

REFERENCE SERVICES DIVISION ADVISORY COMMITTEE FOR THE READY REFERENCE CENTER.

Ruth D. Grotheer, Queens Borough Public Library, Jamaica, L.I., New York.

Mrs. Margaret D. F. Clark, Queens Borough Public Library, Jamaica, L. I., New York.

Mrs. Tamara Grad, Queens Borough Public Library, Jamaica, L. I., New York.

Marjorie H. Leek, Queens Borough Public Library, Jamaica, L. I., New York.

Jean McK. Murphy, Queens Borough Public Library, Jamaica, L. I., New York.

Mrs. Frances Neel Cheney, Library School, George Peabody College for Teachers, Nashville, Tennessee.

J. Ronald Todd, University of Washington Library, Seattle, Washington.

Mildred Hill, Washington State Library, Olympia, Washington.

Ronald V. Glens, ALA Staff Liaison, Chicago, Illinois.

APPENDIX C TO SECTION I

ROSTER OF PROFESSIONAL AND NON-PROFESSIONAL EXHIBIT STAFF

ROSTER OF PROFESSIONAL STAFF

	ASSIGNMENT	TRAINING GROUP
Anderson, Dorothy J. 1006 Warren Avenue, N., Seattle 9, Washington Seattle Public Library, Seattle, Wn.	CW	V
Austin, Mrs. Betty L. 4009 - 15th N.E., Apt. 722, Seattle 5, Wn. Sch. of Architecture & Urban Planning, U. of Wn., Seattle 5, Wn.	Stand-by	I
Bancroft, Mrs. Beverly A. 815 S.E. Cheshire Road, Beaverton, Oregon Ridgewood School, Beaverton, Ore.	CW	I
Bell, Nancy D. 1255 Hillcrest Drive, San Jose, 24, California IBM Library, San Jose, Calif.	AR	I
Bevis, L. Dorothy 4710 - 22nd N.E., Seattle 5, Washington School of Librarianship, U. of Wn., Seattle 5, Wn.	Stand-by	II
Bismuti, Gene 817 Carlyon Avenue, Olympia, Washington Washington State Library, Olympia, Wn.	Stand-by	III
Botham, Jane 30 Old Shore Road, Madison 4, Wisconsin Madison Public Library, Madison, Wisc.	CW	VI
Brown, Mrs. Virginia L. 122 W. Foothill Blvd., Arcadia, California Consultant, Encyclopaedia Britannica	RR	V
Burns, Robert W., Jr. 724½ White Avenue, Moscow, Idaho University of Idaho, Moscow, Idaho	RR	III
Byerly, Mrs. E. Mary 701 First St., W., Mt. Vernon, Iowa Cornell College, Mt. Vernon, Iowa	CW	III

I-C-2

	ASSIGNMENT	TRAINING GROUP
Bynoe, Karl S. 12 Devon Street, Boston 21, Massachusetts M.I.T. Libraries, Cambridge 39, Mass.	RR	III
Carmichael, Betty L. 2712 Beech Drive, Columbus, Indiana Central Jr. High School, Columbus, Ind.	LRC	VI
Cianciolo, Pauline A. 2116 S. 108th Street, West Allis, Wisconsin Cudahy Public Schools, Cudahy, Wisc.	LRC	VI
Cline, Mrs. Catharine B. R.R.X., Olympia, Washington Washington State Library, Olympia, Wn.	Stand-by	VI
Colcord, Mrs. Carol A. 10590 S.W. 85th Avenue, Portland 23, Oregon Fowler Jr. High School, Tigard, Ore.	LRC	V
Connors, Mrs. Betty J. 7 Virginia Lane, Rochester 11, New York Chili Public Library, Chili, New York	LRC	I
Cook, Edgar T. 7234 Rosebay Street, Long Beach 8, California Long Beach State College, Long Beach, Calif.	RR	VI
Courtier, Audrey P.O. Box 224, Chicago 90, Illinois Consultant, Encyclopaedia Britannica	RR	VI
Cox, Mrs. Barbara S. 650 James Street, Fairview, Massachusetts Base Library, Westover AFB, Mass.	RR	IV
Cox, Carl T. 11 James Street, Cortland, New York State University College, Cortland, New York	LRC	II
Crutchfield, Mary J. 112 S. Prospect Street, Apt. 4, Hagerstown, Md. Fairchild Aircraft & Missiles Div., Hagerstown, Md.	LRC	I
Cutler, Dorothy R. Rt. 2, Box 49D, Olympia, Washington Washington State Library, Olympia, Wn.	Stand-by	II

I-C-3

	ASSIGNMENT	TRAINING GROUP
Dawson, Elizabeth A. 6243 Acacia Street, Los Angeles 56, Calif. Los Angeles City Schools, Los Angeles, Calif.	LRC	VI
de la Garza, Peter J. 122 - 10th St., S.E., Washington 3, D.C. Pan American Union Library, Washington, D.C.	AR	III
Denman, Othella 2912 Fort Avenue, Waco, Texas Waco High School, Waco, Texas	LRC	II
Derner, Mrs. Carol A. 303 Chester Avenue, Valparaiso, Indiana Valparaiso High School, Valparaiso, Ind.	CW	IV
Diamond, Mrs. Helen H. 4137 Margaretta Street, St. Louis 15, Missouri Harris Teachers College, St. Louis, Missouri	LRC	IV
Dickinson, Sarah G. 1221 - 104th Ave., N.E., Bellevue, Washington Bellevue Public Schools, Bellevue, Wn.	CW	III
Doyle, Dorothy 412 E. 12th St., Apt. 5, Olympia, Washington Washington State Library, Olympia, Wn.	Stand-by	VI
Dundas, Donald E. 1730 Dundas Street, Wenatchee, Washington Wenatchee High School, Wenatchee, Wn.	Stand-By	II
Edens, Mrs. Marietta H. 64 North Fir Street, Ventura, California Ventura County Library, Ventura, Calif.	RR	V
Emerson, William L. 433 W. 7th St., Apt. 10, Long Beach 13, Calif. Long Beach Public Library, Long Beach, Calif.	AR	II
Evans, Mrs. Hazel M. 6220 - 38th N.E., Seattle 15, Washington University of Washington Library, Seattle 5, Wn.	Stand-by	II
Field, Mrs. Carolyn W. 1A Manheim Gardens, Philadelphia 44, Pennsylvania Free Library of Philadelphia, Pa.	CW	VI

	ASSIGNMENT	TRAINING GROUP
Fijalka, Donna M. 4419 S. 12th St., Tacoma, Washington Tacoma Public Library, Tacoma, Wn.	CW	II
Fisher, Winnifred J. 4750 University Way, Apt. 101, Seattle, Wn. Seattle Public Library, Seattle, Washington	Stand-by	III
Fleischer, Miriam L. 506 W. 122nd Street, New York, New York New York Public Library, New York, N.Y.	RR	III
Gengler, Rita A. 1507 E. Liberty Ave., Spokane 27, Washington Spokane Public Library, Spokane, Wn.	RR	V
Gilden, William K. 292 - 27th Ave., San Francisco 21, California San Francisco Public Library, San Francisco, Calif.	AR	VI
Gray, Margaret C. 573 Kaimake Look, Kailua, Oahu, Hawaii Library of Hawaii, Honolulu, Hawaii	CW	III
Greco, Anthony, Jr. 924 Garden Street, Santa Barbara, California University of California, Santa Barbara, Calif.	RR	IV
Greig, Mary N. 815 S.W. Vista Avenue, Portland 5, Oregon Library Association of Portland, Ore.	CW	I
Guptill, Mrs. Barbara 210 N.E. 82nd St., Seattle 15, Washington Seattle Public Library, Seattle, Wn.	Stand-by	I
Gurnee, Mrs. Rita M. 811 E. Ada Avenue, Glendora, California Mt. San Antonio College, Walnut, Calif.	RR	I
Haas, Herbert P. 7000th Support Wing, APO 57, New York, N.Y. Wing Library, 7000th Support Wing, APO 57, New York, N.Y.	AR	II
Hake, Shirley 603 East 6th, Ellensburg, Washington Library, Moses Lake, Wn.	Stand-by	III

I-C-5

	ASSIGNMENT	TRAINING GROUP
Hanke, Mrs. Maxine K. 2727 - 29th, N.W., Washington, D.C. National Library of Medicine, Washington, D.C.	RR	VI
Hanna, Mrs. Mary A. 1517 S. Genesee Drive, Lansing 15, Michigan Michigan State Library, Lansing, Mich.	LRC	V
Hill, Mildred M. 1702½ E. 4th, Olympia, Washington Washington State Library, Olympia, Wn.	Stand-by	II
Hoehn, Eleanor J. 3143 N. 94th St., Milwaukee 22, Wisconsin Milwaukee Lutheran High School, Milwaukee, Wisc.	CW	IV
Holcomb, Marcia R. 1002 Edinburgh Lane, Denton, Texas North Texas State University, Denton, Texas	CW	I
Holleman, Mrs. Marian P. 2069 Sea View Avenue, Del Mar, California University of Southern California, Los Angeles California	AR	V
Holleman, W. Roy 2069 Sea View Avenue, Del Mar, California Sch. of Library Science, U. of So. Calif., Los Angeles, California	Stand-by	V
Hudson, Jean 1535 Walnut Street, Apt. 2, Berkeley 9, Calif. University of California, Berkeley, Calif.	RR	III
Jetter, Margaret A. 925 Stratton Drive, Pontiac, Michigan Curriculum Materials Center, Waterford Township Schs., Pontiac, Mich.	LRC	III
Jones, Mrs. Clara S. 16631 Princeton, Detroit 21, Michigan Detroit Public Library, Detroit, Mich.	RR	I
Jones, Stanley J. 8809 South 124th St., Renton, Washington McKnight Jr. High School, Renton, Wn.	Stand-by	II
Kanner, Elliott E. 119 Okanogan Ave., Apt. 39, Wenatchee, Wash. North Central Regional Library, Wenatchee, Wn.	Stand-by	II

	ASSIGNMENT	TRAINING GROUP
Keefe, Margaret 224 E. Court Street, Flint 3, Michigan Flint Public Library, Flint, Mich.	RR	V
Kenney, Mrs. Brigitte L. 826 Simpson, Evanston, Illinois Transportation Center Library, Northwestern U., Evanston, Ill.	RR	IV
Kinney, Ruth 2N423 Elm, Elmhurst, Illinois York Community High School, Elmhurst, Ill.	LRC	IV
Kittle, Arthur T. 918 Glenbrook Drive, N.W., Atlanta 18, Georgia Georgia Institute of Technology, Atlanta, Ga.	AR	I
Ladley, Mrs. Winifred C. 1114 Broadmoor, Apt. 2, Champaign, Illinois Grad. Sch. of Lib. Sci., U. of Illinois, Champaign, Ill.	CW	V
Langhans, Rufus B. 2 Smithtown Blvd., West, Smithtown, New York Smithtown High School, Smithtown, N.Y.	LRC	I
Lawton, Elizabeth A. 3206 Norton, Apt. 2, Everett, Washington Snohomish County Library, Everett, Wn.	CW	II
Lindsey, Mrs. Marie J. 1114 So. 18th Street, Tacoma 5, Washington Ft. Lewis Library System, Fort Lewis, Wn.	Stand-by	I
Lockwood, Alice D. 2 Washington Place, Cranford, New Jersey Consultant, Encyclopaedia Britannica	RR	II
Long, Katharine M. 371 Euclid Avenue, Oakland 10, California Tennyson High School, Hayward, Calif.	AR	IV
Madden, Mrs. Doreitha R. 97 Browning Avenue, Trenton 8, New Jersey New Jersey State Library, Trenton, N.J.	RR	II
Mason, Mary B. 1823 S.W. Market, Portland, Oregon Multnomah County Library, Portland, Ore.	CW	VI

	ASSIGNMENT	TRAINING GROUP
May, F. Curtis 100 Duane St., Apt. 10, Redwood City, California Sequoia High School, Redwood City, Calif.	LRC	IV
Maybury, Mrs. Catherine M. 47 Mansfield Apts, Storrs, Connecticut University of Connecticut, Storrs, Conn.	RR	I
McClain, Alice 735 E. Halliday Street, Pocatello, Idaho Idaho State College, Pocatello, Idaho	RR	II
McClaskey, Harris C. 527 E. 13th, Apt. 12, Olympia, Washington Washington State Library, Olympia, Wn.	Stand-by	III
McDonough, Judith A. 127½ W. 8th, Claremont, California Scripps College, Claremont, Calif.	RR	V
McTighe, Marianne 217 Wheeler Ave., Scranton 10, Pennsylvania University of Scranton, Pa.	RR	VI
Mignon, Edmond 2530 Kansas Avenue, Santa Monica, California UCLA, Los Angeles, Calif.	RR	II
Miller, Albert J. 320 W. Birch Street, Butler, Pennsylvania Butler Area Sr. High School, Butler, Pa.	LRC	II
Miller, Ronald F. 444 Park Street, Montclair, New Jersey Montclair High School, Montclair, N.J.	LRC	V
Moen, Adelaide 1360 Lake Shore Drive, Chicago, Illinois Consultant, Encyclopaedia Britannica	RR	III
Morris, Junius H. 2011 Haven Way, Pullman, Washington Washington State University, Pullman, Wn.	Stand-by	II
Morris, Thelma J. 4141 Brooklyn Avenue, N.E., Seattle 5, Washington Business Administration Lib., U. of Wn., Seattle 5, Washington.	AR	V

	ASSIGNMENT	TRAINING GROUP
Moss, Mrs. Carol E. 2958 Rosemary Lane, San Jose, California San Jose Public Library, San Jose, Calif.	CW	V
Norton, Alice L. 2658 Bryden Road, Columbus 9, Ohio Denver Public Library, Denver, Colorado	AR	VI
Oathout, Melvin C. 1005 Virginia Ave., West Sacramento, Calif. California State Library, Sacramento, Calif.	AR	V
Orr, Mrs. Maryde F. 806 Van Giesen, Richland, Washington G.E. Plant Technical Library, Richland, Wn.	Stand-by	I
Osowski, Joan M. 23 E. Eager Street, Baltimore 2, Maryland Enoch Pratt Free Library, Baltimore, Md.	CW	IV
Parsons, Mrs. Mary D. Goldsmith 39A - Polanco, Mexico City 5, D.F., Mexico Mexico City College, Mexico D.F., Mexico	RR	II
Patterson, Flora E. 141 Cooper Street, Apt. 603, Otawa 4, Ontario, Canada National Library, Ottawa, Ontario, Canada	RR	VI
Perrine, Richard H. 5701 Jackson, Apt. 105, Houston 4, Texas Rice University, Houston, Texas	RR	I
Peterson, Marion E. 4141 Brooklyn Ave., N.E. Seattle 5, Washington Sch. of Librarianship, U. of Wn., Seattle 5, Wn.	Stand-by	VI
Pocock, Peter G. 1111 Mission Canyon Road, Santa Barbara, Calif. G.E. Tech. Military Planning Operation, Santa Barbara, Calif.	AR	V
Poole, Harold A. 170 - 11th Avenue, Seattle 22, Washington Law Library, U. of Wn., Seattle 5, Wn.	AR	V

	ASSIGNMENT	TRAINING GROUP
Pooler, Jack 1517 Fountain Street, Alameda, California Stanford University Libraries, Stanford, Calif.	RR	II
Pope, Elspeth 2101 No. Fife, Tacoma 4, Washington University of Puget Sound, Tacoma, Wn.	RR	V
Rand, Lawrence W. 1817 N.E. 55th St., Seattle 5, Washington	CW	I
Reynolds, Maryan E. 1702½ East 4th, Olympia, Washington Washington State Library, Olympia, Wn.	Stand-by	VI
Rheay, Mary L. 4555 Meadow Valley Dr., N.E., Atlanta 5, Georgia Atlanta Public Library, Atlanta, Ga.	CW	I
Richardson, Mrs. Alice 7096 Binney, Omaha, Nebraska Consultant, Encyclopaedia Britannica	RR	I
Riggs, Neil R. 111 Eighth Avenue, Brooklyn 15, New York New York Public Library, New York, N.Y.	AR	III
Roberts, Janice S. (Trained with Group I, served with Group VI) 621 West Galer, Apt. 302, Seattle 99, Washington Seattle Public Library, Seattle, Wn.	RR	VI
Ryberg, H. Theodore 107 Bridget Circle, Syracuse 7, New York Syracuse University Libraries, Syracuse, N.Y.	AR	I
Salmon, Eugene N. 1141 Noyes Street, Evanston, Illinois Library Tech. Project, American Library Assn., 50 E. Huron St., Chicago, Ill.	Stand-by	IV
Schultz, Jack E. 629 Park Avenue, Beloit, Wisconsin Beloit College, Beloit, Wisc.	RR	III
Schweinfurth, Edna L. 331 South Alvernon Way, Apt. 15, Tucson, Arizona University of Arizona, Tucson, Ariz.	AR	III

	ASSIGNMENT	TRAINING GROUP
Shober, Joyce L. 1021 Broadway, San Francisco 11, California San Francisco State College, San Francisco, Calif.	RR	I
Smith, Dorothy C. 2322 Terrace Way, Columbia 5, South Carolina Richland County Public Library, Columbia, S.C.	RR	IV
Smith, Helen L. 1405 - 21st Ave., S., Nashville 12, Tennessee Consultant, Encyclopaedia Britannica	RR	IV
Stribley, Sheila M. 1750 Norfolk, Apt. 15, St. Paul, Minnesota Minneapolis Public Library, Minneapolis, Minn.	AR	II
Sullivan, Maureen 5535 W. Quincy Street, Chicago 44, Illinois Yamato Dependents High School, Tokyo, Japan	LRC	III
Taylor, W. Desmond 3014 N. 34th Street, Tacoma, Washington University of Puget Sound, Tacoma 6, Wn.	Stand-by	I
Vagianos, Louis G. 255 Cypress Street, Providence 6, Rhode Island Brown University Library, Providence, R.I.	AR	IV
Walker, Elaine M. 220 Triphammer Road, Ithaca, New York Cornell University Libraries, Ithaca, New York	AR	VI
Ward, David B. 1061 Blaney Avenue, San Jose 29, California Foothill College, Los Altos Hills, Calif.	RR	IV
Ward, Mrs. Marietta M. 8403 - 31 N.E., Seattle 15, Washington Music Library, U. of Wn., Seattle 5, Wn.	Stand-by	I
Wedgeworth, Robert Jr. 3448 East 54th St., Kansas City 30, Missouri Kansas City Public Library, Kansas City, Mo.	AR	I
Westby, Barbara 14350 Warwick, Detroit 23, Michigan Detroit Public Library, Detroit, Mich.	Stand-by	IV

I-C-11

	ASSIGNMENT	TRAINING GROUP
Wheatley, Mrs. Bernice C. 2008 E. Louisa Street, Seattle 2, Washington Snohomish County Library, Everett, Wn.	Stand-by	II
Wheeler, Mrs. Sara H. 5120 N.E. Latimer Pl., Seattle 5, Washington Sch. of Librarianship, U. of Wn., Seattle 5, Wn.	Stand-by	II
Whitaker, Douglas A. 1124 Denis Ct., Wenatchee, Washington North Central Regional Library, Wenatchee, Wn.	Stand-by	II
White, Mrs. Ruth W. 22 Parkway Street, Cocoa, Florida Brevard Jr. College, Cocoa, Florida	LRC	III
Wiles, Thomas C. 414 E. Sixth Street, Hobart, Indiana Public Libraries of Lake County, Indiana	CW	II

ROSTER OF NON-PROFESSIONAL STAFF.

Cole, James M. 4801 - 24th Ave., N.E., Seattle, Washington	April - October
Harrison, J. Derek 1436 N.W. 193rd St., Seattle, Washington	April - October
Hinz, Robert B. 4801 - 24th Ave., N.E., Seattle, Washington	April - August
Kelly, James L. 4801 - 24th Ave., N.E., Seattle, Washington	April - October
Kittle, Jay 2345 E. Waverly Avenue, Tucson, Arizona	June - August
Martin, Wayne L. 7500 Linda Lane, Bedford, Ohio	June - August
Sjostrom, John R. 425 Park Place, Everett, Washington	April - October
Svahn, John A. 4703 - 21st Ave., N.E., Seattle, Washington	April - October

APPENDIX D TO SECTION I

APPLICATION FOR SERVICE WITH LIBRARY 21 EXHIBIT

APPLICATION FOR SERVICE WITH LIBRARY 21 EXHIBIT
SEATTLE WORLD'S FAIR, SEATTLE, WASHINGTON

Mr.
Mrs.
Miss ______________________________
Name in full - print or type

ATTACH RECENT PHOTO
OF YOURSELF HERE

____
Home address

____
City Zone State

Single ( ); Married ( ); Divorced ( ); Widowed ( )

Height _____ Weight _____ Health __________

Physical defects? (specify) __________

____

EDUCATION (college or university)

Name of Institution	Location	Dates	Degree date
Library School	Location	Dates	Degree date

Undergraduate major(s): ______________________________

Graduate major(s): ______________________________

Languages spoken fluently: ______________________________

Have you undertaken formal study of information storage and retrieval systems?
Specify: ______________________________

____

PROFESSIONAL REFERENCE (give the name of the person you have asked to provide a letter of recommendation; should be your immediate superior if possible, or a person with whom you have worked for some time.

____
Name in full Title Address

I-D-2

HOUSING NEEDS (If selected for service with Library 21, what housing accommodations would you require?

Stay with friends ____; UW Residence Hall ___; Hotel or apt.___; Other ____

PROFESSIONAL LIBRARY EXPERIENCE

Library	Location	Position	Dates

OTHER EXPERIENCE

Institution	Location	Position	Dates

In applying for service with Library 21, it is understood that you will receive the cost of round-trip air coach or surface transportation, whichever is lower, (tax exempt), between your home and Seattle, plus $10.00 per day toward housing, meals, and other expenses. The per diem begins on the first day of instruction, ends the last day of service with the Exhibit.

PERIODS OF SERVICE DESIRED (number in order of desirability)

____Sec. 1 April 16-May 18 (33 days)
____Sec. 2 May 14-June 15 (33 days)
____Sec. 3 June 11-July 13 (33 days)
____Sec. 4 July 9-Aug. 17 (40 days)
____Sec. 5 Aug. 13-Sept 21 (40 days)
____Sec. 6 Sept. 17-Oct. 21 (35 days)

AREA OF SERVICE DESIRED (rank in order of experience and preference)

____ Children's services (pre-school & elementary)

____ Learning Resources Center (secondary level)

____ Adult services (readers' advisory)

It is understood that if selected to serve with Library 21, I hereby authorize the American Library Association and the Seattle World's Fair to reproduce my physical likeness in still photographs, movie film, and TV film, and to record my voice on phonograph or tape recordings, for purposes of publicity in connection with the Fair or Library 21.

____________________ Date of application
____________________ Signature

RETURN THIS APPLICATION ALONG WITH ONE LETTER OF RECOMMENDATION TO:
GORDON P. MARTIN, LOCAL PROJECT DIRECTOR, LIBRARY 21 EXHIBIT, SEATTLE PUBLIC LIBRARY, SEATTLE 4, WASHINGTON.

You will be notified as soon as possible if you have been selected for service.

1-22(2M) Form I

APPENDIX E TO SECTION I

TYPICAL SCHEDULE FOR PROGRAM OF EDUCATION

The schedule for each of the six groups of librarians varied somewhat in detail, but essentially followed this pattern:

Monday

8:30 - 9:30 AM	Tour of Library 21 Exhibit	(Martin)	Coliseum
9:30 - 10:00 AM	Fair Identification	(Martin)	Armory
10:30 - 12 Noon	Class	(Hayes)	Classroom
1:00 - 5:00 PM	Class	(Hayes)	Classroom

Tuesday

8:30 - 5:00	Class	(Hayes)	Classroom
7:00 - 9:00 PM	Orientation at Exhibit	(Martin)	Exhibit

Wednesday

8:30 - 5:00	Class	(Hayes)	Classroom
7:00 - 9:00 PM	Orientation at Exhibit	(Martin)	Exhibit

Thursday

8:30 - 5:00	Class	(Hayes)	Classroom
7:00 - 9:00 PM	Seminar with earlier group	(Martin)	Classroom

Friday

8:30 - 5:00	Class	(Hayes)	Classroom

Saturday

Begin regular schedule of service at exhibit.

TRAINING AND SERVICE DATES

Group	Instruction	Service	Total Days
1	April 16 - 20	April 21 - May 18	33
2	May 14 - 18	May 19 - June 15	33
3	June 11 - 15	June 16 - July 13	33
4	July 9 - 13	July 14 - August 17	40
5	August 13 - 17	August 18 - Sept. 21	40
6	Sept. 17 - 21	Sept. 22 - Oct. 21	35

APPENDIX F TO SECTION I

EVALUATION OF LIBRARY 21 EXHIBIT AND INSTRUCTION FORM

As a part of a contract with the U.S. Office of Education, A.L.A. is required to produce a report on the LIBRARY 21 EXHIBIT at the Fair. In a portion of that report, we want to evaluate your experience as a member of the professional staff of the exhibit. We would appreciate frank answers to the following questions and any comments you may wish to add. Gordon P. Martin, Local Project Director.

Name ______________________________

Home Address ______________________________

Present Position ______________________________

Library School ______________ Degree date & ______________

Professional experience (specify years)

School _____ College _____ University _____ Public _____ Special ______________

1. Was your pay status continued for the duration of the project? __________

2. Were you able to manage on per diem supplied by the project? __________

3. Did you receive any other financial assistance? In what way? __________
   ______________ How much __________

CONCEPTS

4. Have you ever been affiliated with scientific libraries? __________

5. Have you ever been concerned with library technology? __________

6. As a librarian, can you visualize a computer-supported:
   Scientific information center __________
   City or branch library __________
   School library __________
   Home library __________

   Comment: ______________________________

7. Can you visualize the technology of LIBRARY 21 in the next 25 - 50 years as being useful and acceptable to the librarian and the reader particularly as follows:
   - World wide trade of information.
   - Automatic storage and retrieval of books.
   - Automatic teaching machines.
   - High density information storage.
   - Auto-indexing or abstracting.
   - Automatic files search.

   Comment:

8. What ideas from LIBRARY 21 will you adapt to your library?

9. Do you think LIBRARY 21 should go on tour as an exhibit?

I-F-3

10. Was the material covered in the course familiar to you?

11. Did your academic training cover similar material?

12. Did you find the course work difficult?

13. In what ways could you have been better prepared for the course?

14. What subject areas would you suggest adding to the course?

15. Were you able to read much of the material placed on reserve?

16. Did you find the reserve material useful?

17. In what ways was the training course helpful to you during your work at the exhibit?

18. What portions of the course were non-essential to your work at the exhibit?

19. Were trips to the exhibit during the training program worth while?

20. Do you feel all librarians should receive training along the lines of the course you took?

21. Can you suggest subject areas that you feel should be included in library school curricula in the future?

EXHIBIT EXPERIENCE

22. How many hours per day did you work?____________

23. Did you find it tiring? ____________

24. Would you prefer longer _____ or shorter _____ work days?

25. In what ways did you feel you were useful at the exhibit?

26. In what ways were you unsuccessful at the exhibit?

27. Do you feel you were sufficiently trained for your duties at the exhibit? Explain.

28. How could training have been improved?

29. Do you feel professional librarians should be serving at a World's Fair exhibit? Why?

30. Do you think the public image of librarians has been improved as a result of this exhibit? Why?

1-F-5

31. Do you think the design of the exhibit was successful? Why?

32. Do you feel the general public got the "message" of the exhibit?

33. In what ways could the exhibit be improved?

34. Did you enjoy most of your contacts with the public?

35. How did you find the public reaction to the exhibit (specify %)?

a. enthusiastic _____	d. bored _____
b. attentive _____	e. scornful _____
c. blase _____	f. non-understanding _____

g. other (specify) ______________ % _____

36. To what aspects of the exhibit did visiting librarians respond most favorably?

37. What negative reactions did you observe?

38. GENERAL COMMENTS: Please add any comments you wish to make about any aspect of the LIBRARY 21 exhibit or training.

Signed ____________________________________ Date ________________________

APPENDIX G TO SECTION I

REPORT ON ATTENDANCE

An actual count of visitors to the LIBRARY 21 Exhibit was made between July 9 and 15, and again between August 27 and September 3. The record of these counts is as follows:

Date	Exhibit Attendance	Fair Attendance	Percent
Monday, July 9	12,068	59,968	20
Tuesday, July 10	12,875	67,529	19
Wednesday, July 11	12,081	64,578	19
Thursday, July 12	11,750	60,998	19
Friday, July 13	9,597	55,233	17
Saturday, July 14	10,400	60,981	17
Sunday, July 15	9,551	57,509	17
	78,322	426,796	18
Monday, August 27	10,858	55,063	20
Tuesday, August 28	11,044	55,173	19
Wednesday, August 29	10,315	53,266	19
Thursday, August 30	8,743	46,654	19
Friday, August 31	7,183	40,756	18
Saturday, September 1	9,057	55,261	16
Sunday, September 2	11,983	68,221	18
	69,183	374,394	18

APPENDIX H TO SECTION I

PUBLICITY SAMPLES

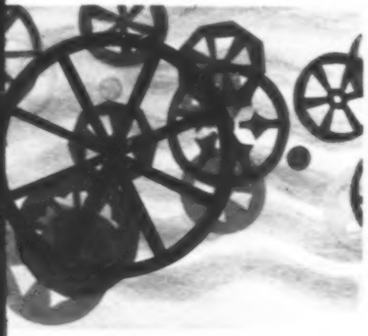
LIBRARY 21 Brochure

Xerox Brochure

Souvenir Microcard

"Should You be a Librarian"

THROUGHOUT HISTORY, THE VARIOUS TRIBES OF MEN HAVE EXPRESSED THEIR INVENTIVENESS IN MANY DIFFERENT WAYS...



WITH THE WHEEL . . .

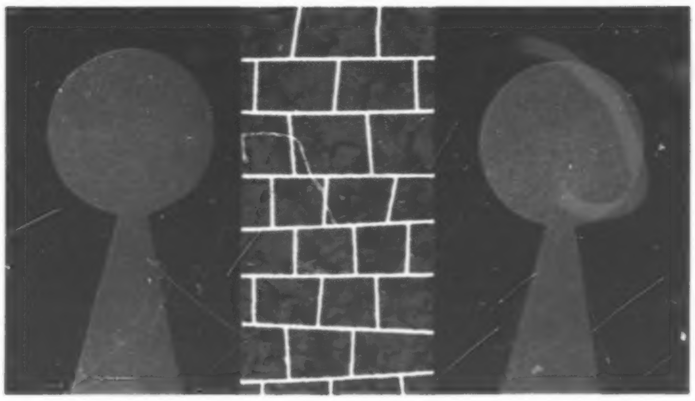
THE CANOE . . .

CELESTIAL NAVIGATION . . .

THE ALPHABET . . .

AND BRAIN SURGERY

BUT NONE OF THESE GROUPS COULD EXCHANGE ANY OF THIS KNOWLEDGE WITH OTHER PEOPLE BECAUSE THERE WAS NO FORM OF WRITTEN COMMUNICATIONS BETWEEN DIFFERENT GROUPS OR CULTURES



As soon as ideas were **recorded**...and stored in **libraries**...civilization developed a memory! Recorded experience, in the form of MODERN LIBRARIES...has become our most precious material possession.

In order to avoid the costly duplication of constantly rediscovering the same basic facts, librarians are working daily to bring increased order to the written records of our civilization...so that important facts can be easily located or verified by anyone interested in a particular problem.

And aiding the efforts of librarians, XEROX CORPORATION is constantly exploring totally new approaches in the technology of permanent and instantaneous visual and written communications.

EVERYDAY

XEROX
CORPORATION

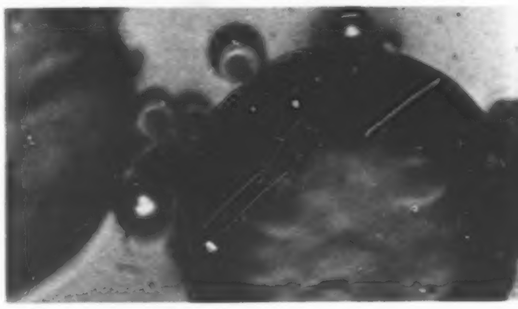
IS MAKING NEW ADVANCES IN

XERORADIOGRAPHY

THIN FILM DEVICES

FINE PARTICLE STUDIES

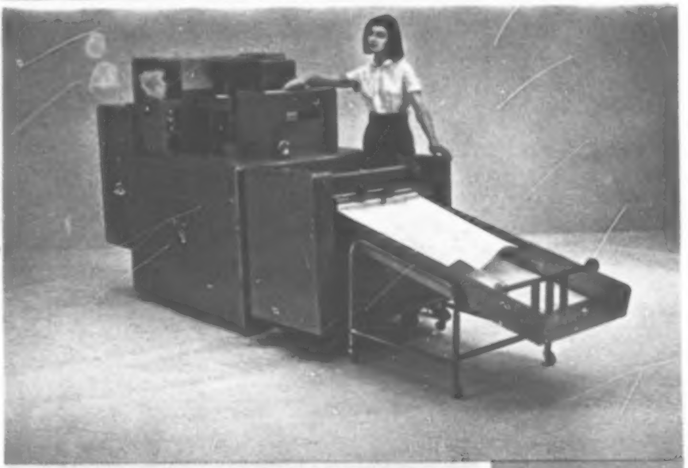
TRIBOELECTRICITY



LIBRARY 21

IS A VISION OF THE FUTURE BUT WITH PRACTICAL FOUNDATIONS ALREADY ESTABLISHED TODAY!

COPYFLO® CONTINUOUS PRINTER

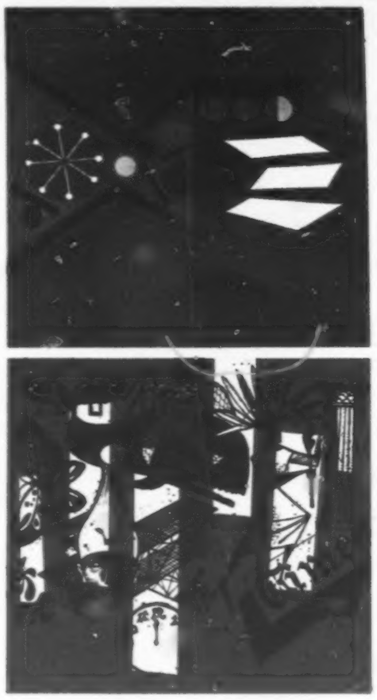


COPYFLO® 24C CONTINUOUS PRINTER

XEROX 914

"Xerography" is a dry process, which uses light and electricity to form permanent images on ordinary paper or any support, in seconds. ■ And from this basic process has come equipment to produce offset masters, enlarged, reduced, or identical size, in seconds. ■ Machines which reproduce dry, permanent, document copies from original material, roll, or card-mounted microfilm, at the rate of twenty feet per minute. ■ Equipment capable of print-out from on-line or off-line input, through cathode ray tube, at a rate in excess of 10,000 characters per second. ■ A revolutionary new type of office copier ... the "914"... which is capable of copying any original, onto ordinary paper, or selected offset masters. As many as seven copies per minute are made automatically, simply by dialing the number desired, and pushing a button.

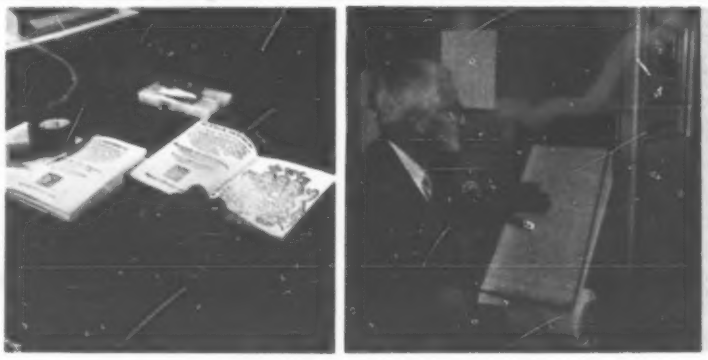
LIBRARY 21 THE LIBRARY OF THE FUTURE



In Century 21, if a researcher wants an article or a reader wants a book, it might well be stored as microfilm in his local library, and he need only request it by code number or name. Within seconds, the computer in the library will scan its "stack" of microfilm, and print out the entire book or article desired, either at the library, or even on a printer in the researcher's office, or the reader's home. ■ If the microfilm is not available in the local library, the computer will inform the patron of this fact, as well as the fact that the material is currently stored in a different library, one which may be in Munich, or Tokyo, or Buenos Aires. It will then query the library which has the microfilm of the particular written material, and this second library might relay the entire book or article, through a signal "bounced" off a satellite, and then "print out" the entire book or article, once again, in the office or home of the original patron, or wherever the "print-out" device happens to be located. Again, the entire process would have required less than a minute.

UNIVERSITY MICROFILMS

A subsidiary of Xerox Corporation has been supplying scholars and businessmen with manuscripts, books, and periodicals, "printed out" from microfilm negatives. These may be old newspaper articles, rare books and first folio editions, or out-of-print reference material. But whatever the source, the xerographic process permits almost instantaneous reproductions of one or a thousand pages, at extremely low cost, of all types of graphic materials.



THE PROCESS OF TODAY. . . THE PROMISE OF TOMORROW

XEROX
CORPORATION

ROCHESTER, NEW YORK

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IN
U.S.A.
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LIBRARY 21

HERE ARE
A FEW OF THE
HIGHLIGHTS
OF THE AUDIO-VISUAL
SPECTACULAR
WHICH YOU HAVE
JUST SEEN...

Under the joint
Sponsorship
of THE AMERICAN
LIBRARY ASSOCIATION
and
XEROX
CORPORATION

The first United States World's Fair in more than twenty years opened in Seattle on April 21, 1962.

In the United States Science Pavilion, an incomparable scientific experience, you take an

SPACE NEEDLE

Some call it the 400-day wonder.

That's the time it took from concept to completion.

It is the Space Needle—symbolic structure of the 1962 Seattle World's Fair.

For sheer audacity and imagination, this is the boldest creation since the Eiffel Tower was built as the symbolic structure of the Fourth French International Exposition in 1889.

The Space Needle is 600 feet high and is crowned by a revolving restaurant, operated—believe it or not—by a 1-horsepower motor. Above the restaurant is a stationary observation deck, from which the visitor sees the magnificent Puget Sound country, City of Seattle, Mt. Rainier, Olympic and Cascade ranges, and the fairgrounds below.

Name of the restaurant is "Eye of the Needle," and in fairness to all fairgoers, no reservations will be taken. It will be first come, first served. Meal prices will be comparable to those in other fine Seattle restaurants.

Two 800-feet per minute, 29 passenger elevators take visitors to the top via outside shafts of the center core. A third elevator is for servicing purposes.

The Space Needle is the tallest building west of the Mississippi River.

BOULEVARDS OF THE WORLD

Exotic avenues joining together the five wondrous Worlds of Century 21, are lined with colorful shops, bazaars and restaurants representing a myriad of countries and cultures . . . a veritable tour of the world!

thentic "rocket ride" a billion light years past the Moon and Mars into remote galaxies of outer space.

You see and experience work, play and travel in the year 2000 A.D. in the massive Coliseum Century 21's "floating city."

Endorsed by the Bureau of International Expositions, the Seattle World's Fair hosts forty nations who fill pavilions with exhibits of the best of their technical predictions; line the boulevards with bazaars displaying the color, charm and craftsmanship of their artisans, and join the continuous parade of music, dance and legitimate plays in new theatres and a huge stadium.

The fun-packed Gayway, with custom rides and complete appeal, emphasizes today's pleasures, amid surrounding acres of pavilions built by top U. S. Industries telling the story of man's better tomorrow.

Stretching out beneath the Space Needle is a magnificent panorama; exciting buildings, landscaped courts and malls dotted with pools and fountains.

The spirit of a true international exposition prevailed from the moment on April 21 when President John F. Kennedy welcomed the world to the Seattle World's Fair.

But as official hosts of the $80,000,000 World's Fair, the United States Government, the State of Washington and the City of Seattle have planned for more than just this great 1962 spectacular.

When the gates close on October 21, the major pavilions will remain, linked to serve as a great center of culture and education.

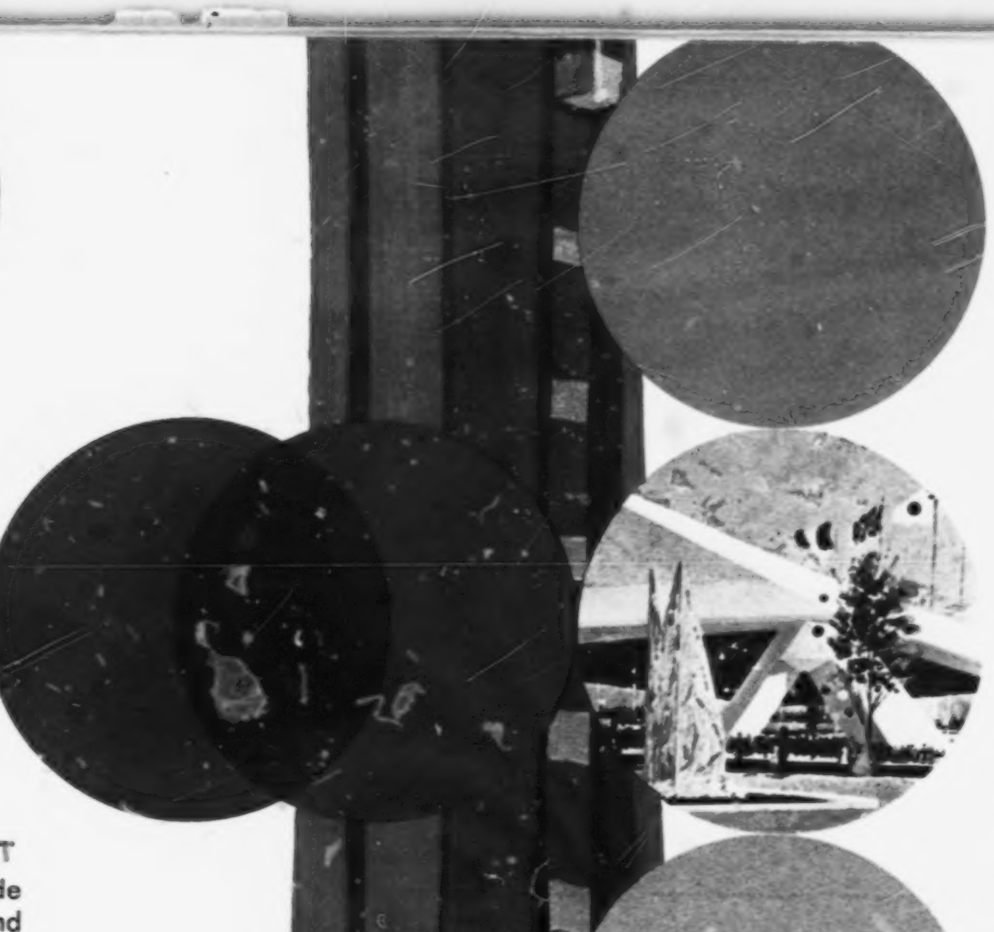
America's Space Age World's Fair is providing the most exciting event in a decade, and a lasting legacy for the citizens of tomorrow.

MAN'S LIFE IN THE SPACE AGE

Here the visitor threads his way past invitational exhibits by top U. S. firms displaying the products they predict will be in use in the coming century: such as the car without wheels, the library of the future. ■ Crossing a landscaped pool, he prepares to rise in an iridescent "bubbleator," a lift which will take 100 persons at a time to the "floating city" above. ■ Then, down the inner corridor, the visitor begins a "vista-drama" where the world of tomorrow has been translated into vibrant images and situations by thousands of man-hours of research by scientists, educators, and designers. ■ The home of the future is shown, for example, as a disposable house. In the kitchen are solar ovens and thermoelectric refrigerators. Cordless appli-

ORLD OF ENTERTAINMENT

continuous international parade performing arts, sports and ectator events appealing to the stes of young and old takes ce at Century 21.



are solar ovens and thermoelectric refrigerators. Cordless appliances cook, clean and iron. ■ Food will vary from frozen exotic fruits, meats and herbs flown from all corners of the world to be combined in gourmet dinners, to mass-produced edible items from cotton and wood wastes, to feed the world's burgeoning population. ■ Schools in the fast-paced, closely-knit world of tomorrow will have "walls" formed by jets of air; floating canvas roofs controlled for the angle of the sun. Teaching teams and teaching machines will double the amount of material presented to the student. ■ Disposable clothing will be popular, including plastic shoes and winter garments light as a feather... Convertiplanes will travel by highway or by air... Anti-gravity machines and time-traveling machines will close the gap of time difference between hemispheres. ■ In this dramatic demonstration of the World of Century 21, the visitor will sense the impact of tremendous changes to be wrought, bringing the universe to his domain. ■ But in countless ways it will be demonstrated still that no machine has been devised which will replace man.

MONORAIL

The world's first high-speed monorail will whisk visitors to the exposition grounds from downtown Seattle—more than a mile—in just 96 seconds! This Swedish Alweg monorail gives the world its first look at a full-scale operation of a high-speed mass transportation system of the future.

AMERICAN LIBRARY ASSOCIATION
50 E. HURON ST., CHICAGO 11, ILL.

LIBRARY 21 EXHIBIT:

Mrs. Florrinell F. Morton, President,
American Library Association.
David H. Clift, Executive Director,
American Library Association.
Alphonse F. Trezza, Associate Executive
Director, American Library Assn. and
Library 21 Staff Liaison.
Joseph Becker, Library 21 Coordinator.
Gordon Martin, Library 21
Local Project Director.
Dr. Irving Lieberman, University of
Washington, Chairman Library 21
Advisory Committee.
Daniel, Mann, Johnson and Mendenhall,
Architects.
Vance Jonson, Designer.
Gene Wild, Assistant to the Designer.

GOVERNMENTAL FOUNDATION AND
INDUSTRIAL PARTICIPANTS:

United States Office of Education.
United States Air Force,
Rome Air Development Center.
United States Department of Commerce.
Council on Library Resources.
Univac, Division of Sperry Rand Corp.
Xerox Corporation.
Encyclopaedia Britannica, Inc.
Great Books of the Western World
of Encyclopaedia Britannica, Inc.
International Business Machines.
Radio Corporation of America.
National Cash Register.
Electronics Teaching Laboratories.
United States Industries,
Educational Science Division.
Electronics Development Laboratories.
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NORSco System (Bookshelves)
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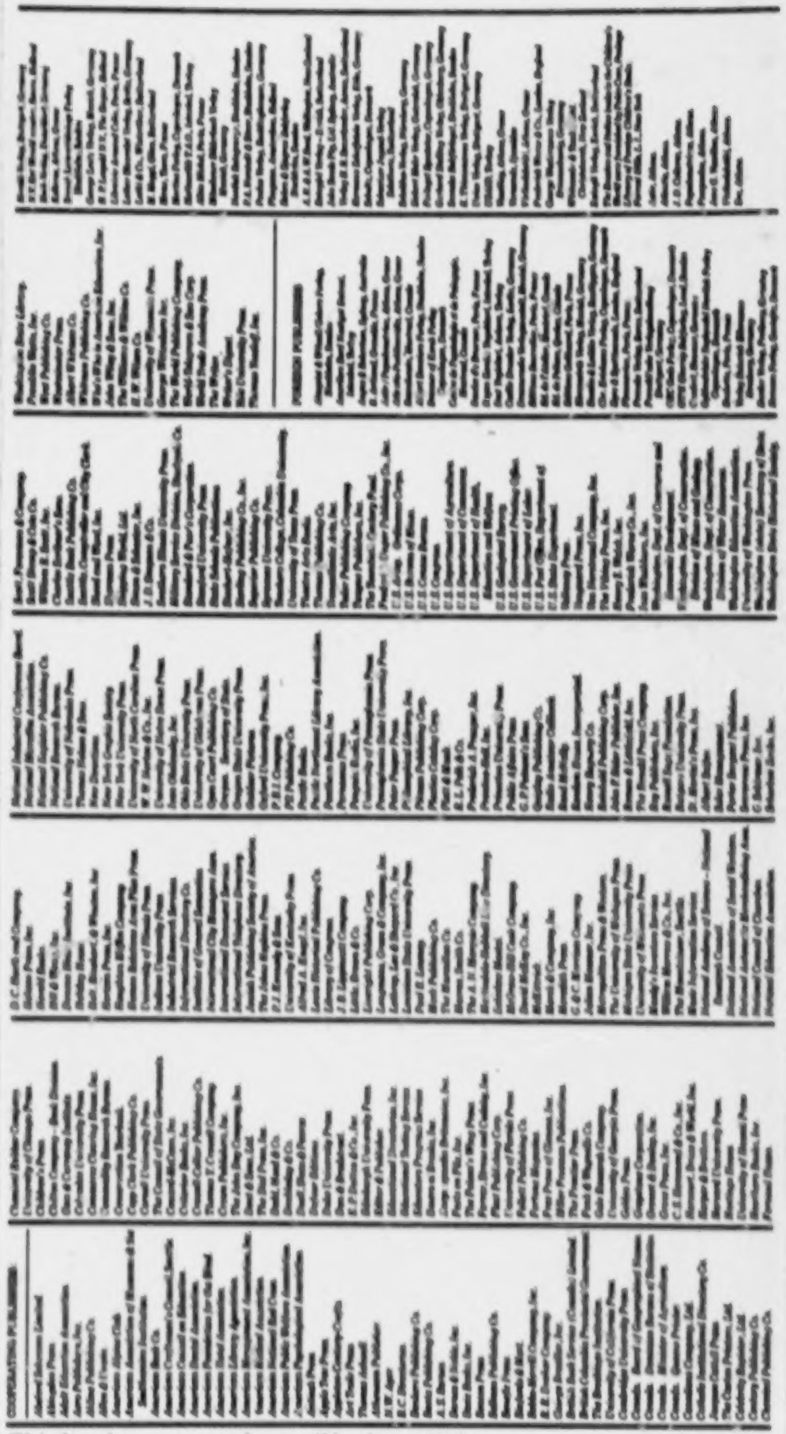


This brochure was made possible through the combined efforts of the following:
Financial support: Gaylord Brothers, Inc.
Printing: Addressograph—Multigraph Corp.
Paper: Crown Zellerbach Corporation.
Staff: Washington State Library and the
Seattle Public Library.
Design: Vance Jonson.

LIBRARY 21

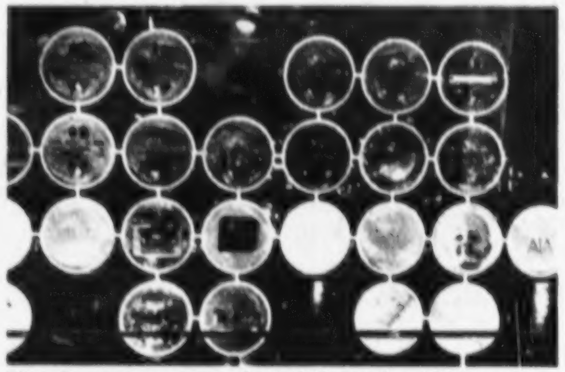
Library 21 is an automated Library of the future designed by the American Library Association in cooperation with leading firms in the electronic and publishing industries.

The American Library Association is the oldest and largest professional library association in the world. The object of the Association is to extend and improve library service and librarianship in the United States and throughout the world. It seeks to do this by making books and ideas vital forces in American life, by making libraries easily accessible to all people, by improving professional standards of librarianship, and by creating and publishing professional literature.

Its membership includes 26,500 libraries, librarians, library trustees, and other friends of libraries who carry out the programs and projects of the Association by intensive volunteer effort.

Through its projects it has encouraged the development of good library service in such far away places as Burma, the Philippines, and Taiwan. Through liaison with federal agencies it has encouraged the enactment of the Library Services Act which has already extended good library service to more than 25,000,000 Americans who had none or who had inadequate service before.

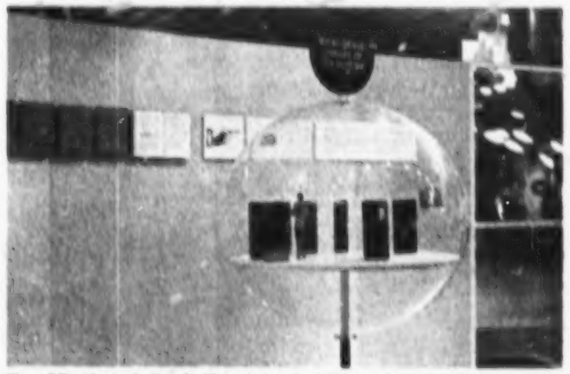
Here you can carry on "conversations" with the great minds of the past, learn about other countries, obtain personalized reading lists tailored to your own interests—all automatic UNIVAC Solid-State 90 Magnetic Tape Computing System. UNIVAC division of Sperry Rand Corporation.



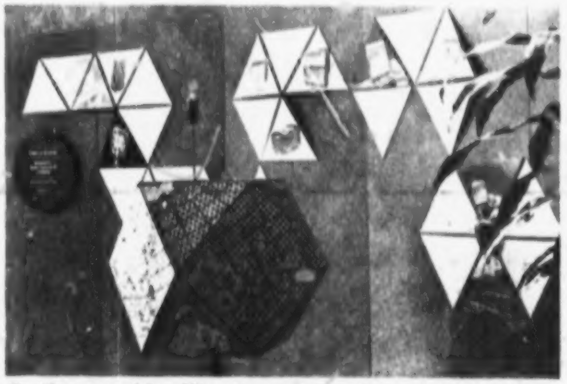
How has man communicated throughout history? The three dimensional exhibit of International Business Machines (IBM) will help you understand the development of communications and learn what's in store for you in the future.

Automation, yes, but Library 21 contains books, too! A "quick" reference service sponsored by Encyclopaedia Britannica is featured at the Ready Reference Center. It's staffed by professional librarians from all over the nation.

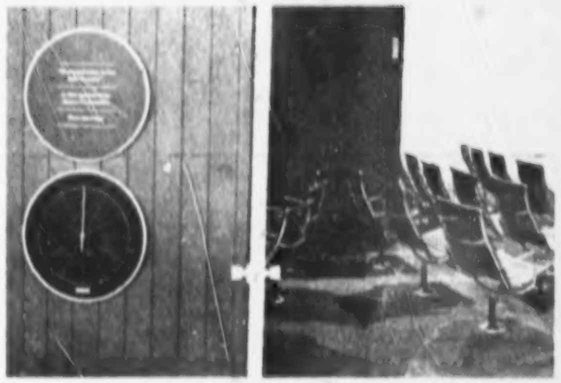
And more books! For Library 21 integrates machines into a book environment. The wonderful world of books as it will be in the library of the future can be enjoyed in the Adult Reading Area. Great Books of the Western World of Encyclopaedia Britannica has provided a comfortable reading area for you featuring carefully selected reading materials.



See National Cash Register's Micro Image Library of the Future where 40,000 books and pamphlets will be fitted into a single volume through the micro image process which reduces materials to one/40,000th of its original size.



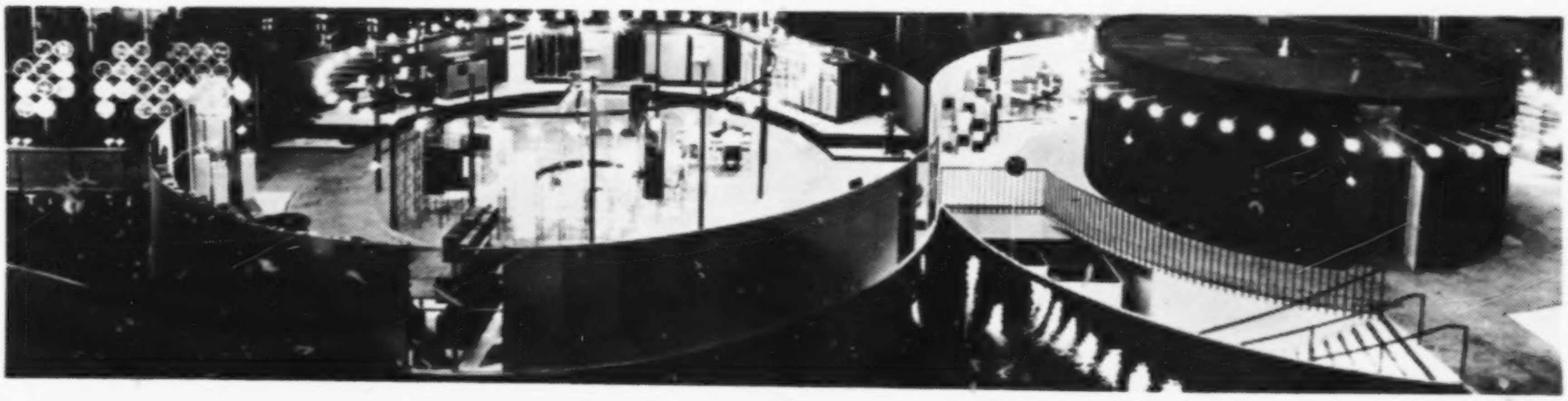
In the RCA video library see how through television communications the unique materials in library centers throughout the world will be made available on call at the press of a button.



In the Xerox Theater see a seven minute color film on the history of man's communication with man. Xerox Corporation, in graphic reproduction shows how microform processes will make knowledge and library materials more accessible to mankind in the future.

Fabulous, you'll say of the 21st century's version of a Learning Resources Center sponsored by the United States Office of Education. See how new educational media will enhance individual learning and self-education—bringing about closer and stronger school and library relationship.

Nor will children be forgotten in this fantastic Library of the Future. Visit the Children's World where "books are fun," "books are wonderful." Over and above the personal contact between the librarian and the child with the book, story hour, children's films and recordings are featured.



AMERICAN LIBRARY ASSOCIATION
LIBRARY-21

ADVANCED TECHNIQUES IN
LIBRARY SERVICE TO THE PUBLIC!

MICROCARD STORY

OF LIBRARY 21

American Library Association

ALA

50 E. Huron St., Chicago 11, Ill.

Credits: Designer, Vance Jonson/Architect, DMJM/Director, Joe Becker

MICROCARD LIMITED EDITION OF CENTURY-21 WORLD'S EXPOSITION SOUVENIR BOOKLET. SEATTLE, WASHINGTON, 1962

THE MICROCARD CORPORATION
MANUFACTURERS OF MICROFORMS • WEST SALEM, WISCONSIN • PHONE 6-2051

APPENDIX I TO SECTION I

LIST OF EQUIPMENT IN LEARNING RESOURCES CENTER

"QUEST" SPACE AREA

Dual-channel Tape Recorder, Model 7.	Electronic Teaching Laboratories, Washington, D.C.
Auto-Tutor, Mark II.	U.S. Industries, Inc., Goleta, California.
Bell & Howell Loop Projector	Bell & Howell Co., Chicago, Illinois.
Telephone	Pacific Northwest Bell, Seattle, Washington.
Memo-Tutor	U.S. Industries, Inc., New York, New York.
Tutor Texts (15 titles)	Doubleday & Co., New York, New York.
Temac Programed Text on French	Encyclopaedia Britannica Films, Inc., Wilmette, Illinois.
Filmac 300 Microfilm Reader-Printer	Minnesota Mining & Manufacturing Co., St. Paul, Minnesota.

DISPLAY AREA

Electronic Display Panels	Electronic Teaching Laboratories, Washington, D.C.
Speed Reader, Jr.	Educational Development Laboratories, Washington, D.C.
Word Clues	"
Flash-X	"
Microcard Reader, Mark VII.	Microcard Corporation, West Salem, Mass.
Recordak Microfilm Reader	Recordak Corporation, New York, New York.
Auto-Tutor, Mark II.	U.S. Industries, Inc. New York, New York.
Magnavox Record Player	Magnavox Corporation, New York, New York.

APPENDIX J TO SECTION I

REPORT ON OFFICE OF EDUCATION CONTRACT FUNDS

At the time this report was prepared, the accounting of contract funds had not been completed. The following is therefore an estimate of expenditures from the contract funds.

TOTAL CONTRACT FUNDS $109,968.00

EXPENDITURES

Item	Budget	Expended
Salaries	$20,200.00	$19,755.00
Transportation & Per Diem	45,020.00	46,020.00
Supplies, Telephone & Postage	2,600.00	3,295.00
Instructional Materials & Report	2,500.00	1,250.00
ALA Consultation	2,500.00	2,500.00
Other Consultation	3,500.00	3,500.00
Construction, Maintenance LRC Area	19,200.00	19,200.00
LRC Graphics	3,000.00	3,000.00
Indirect Costs	11,448.00	11,448.00
	$109,968.00	$109,968.00

BALANCE . . . . None

APPENDIX K TO SECTION I

PHOTOGRAPHS OF THE LIBRARY 21 EXHIBIT

Fig. 1 View of entire LIBRARY 21 Exhibit.
Fig. 2 Sperry Rand Univac Solid State 90 Computer.
Fig. 3 Ready Reference Center.
Fig. 4 Adult Reading Area.
Fig. 5 Learning Resources Center.
Fig. 6 Model Study or "Quest" Space.
Fig. 7 Learning Resources Center Equipment.
Fig. 8 Xerox Theatre.
Fig. 9 R.C.A. and N.C.R. Exhibits.
Fig. 10 Children's World.

Figure 1
View of entire Library 21 Exhibit. Main entrance at the left of photo.
Photo by Morley

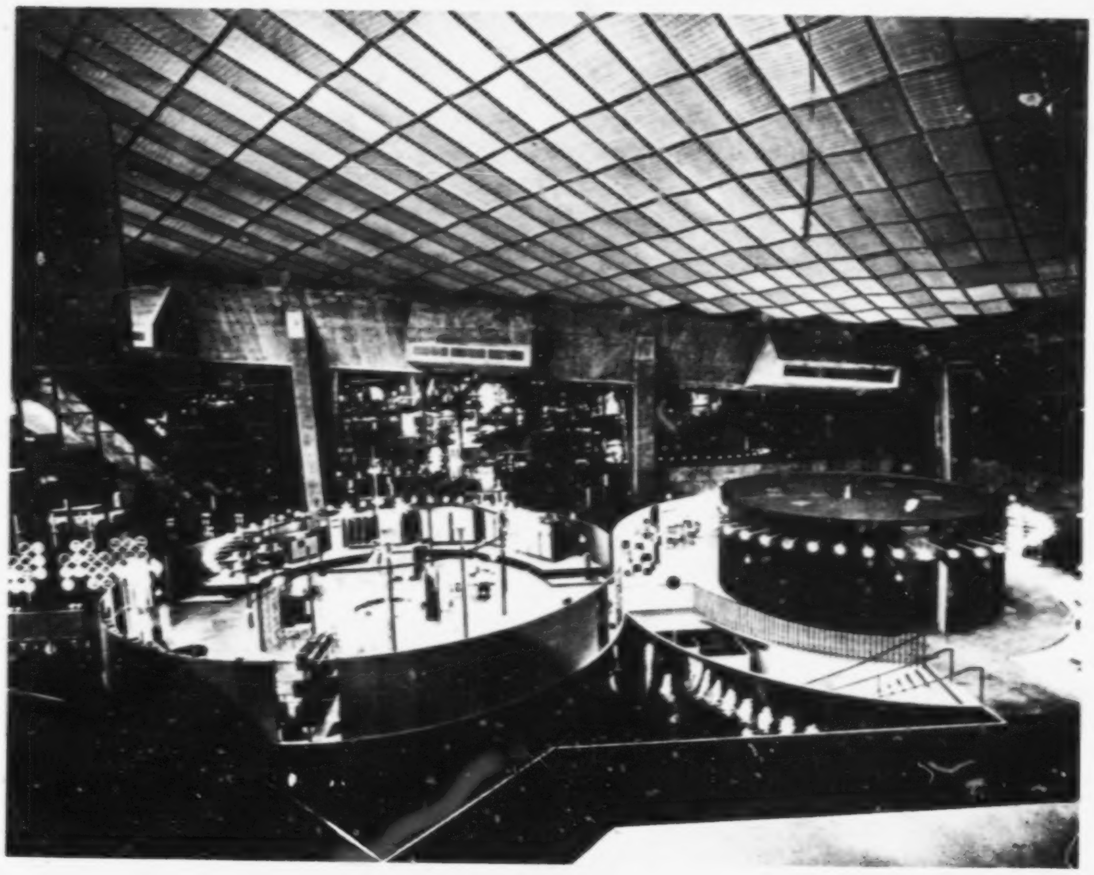


Figure 2
First circle exhibit area showing
Sperry Rand Univac Solid State 90 Computer.
Photo by Morley

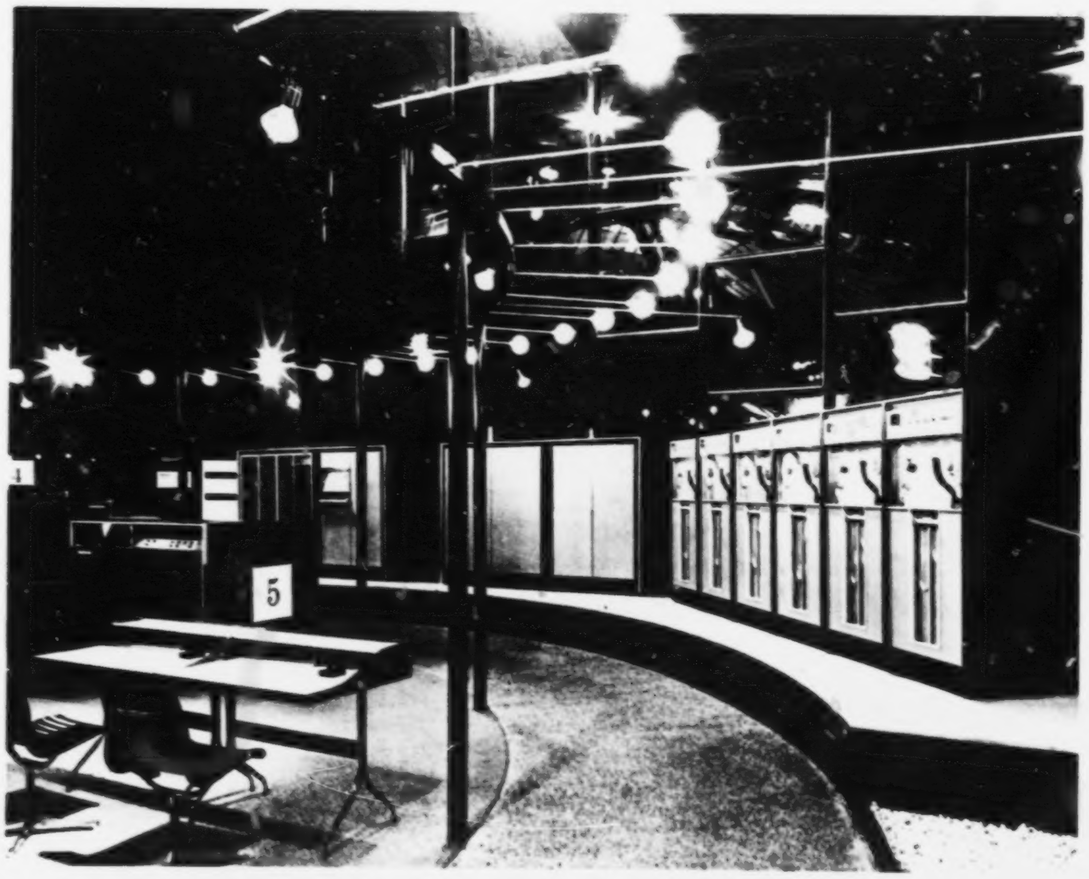


Figure 3
Ready Reference Center, sponsored by Encyclopaedia Britannica.
Photo by Morley

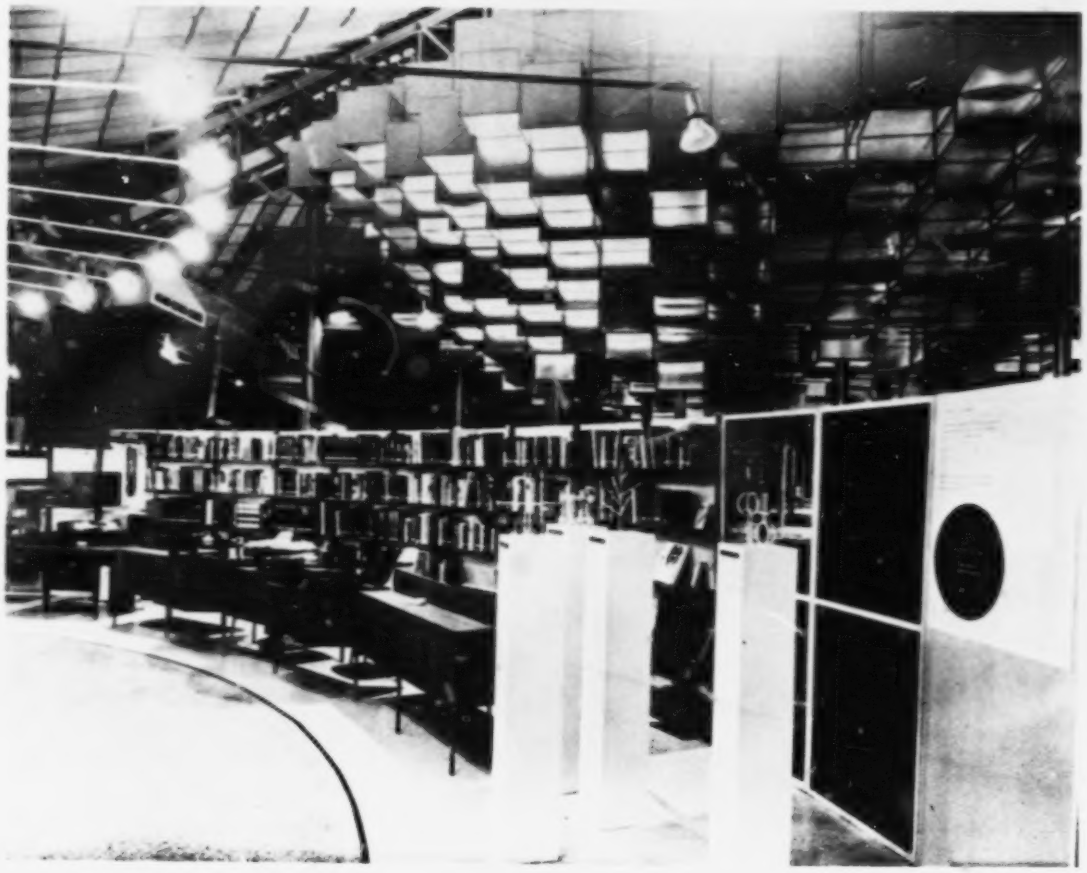


Figure 4
Adult Reading Area, sponsored by Great Books of the Western World, a division of Encyclopaedia Britannica.
Photo by Morley

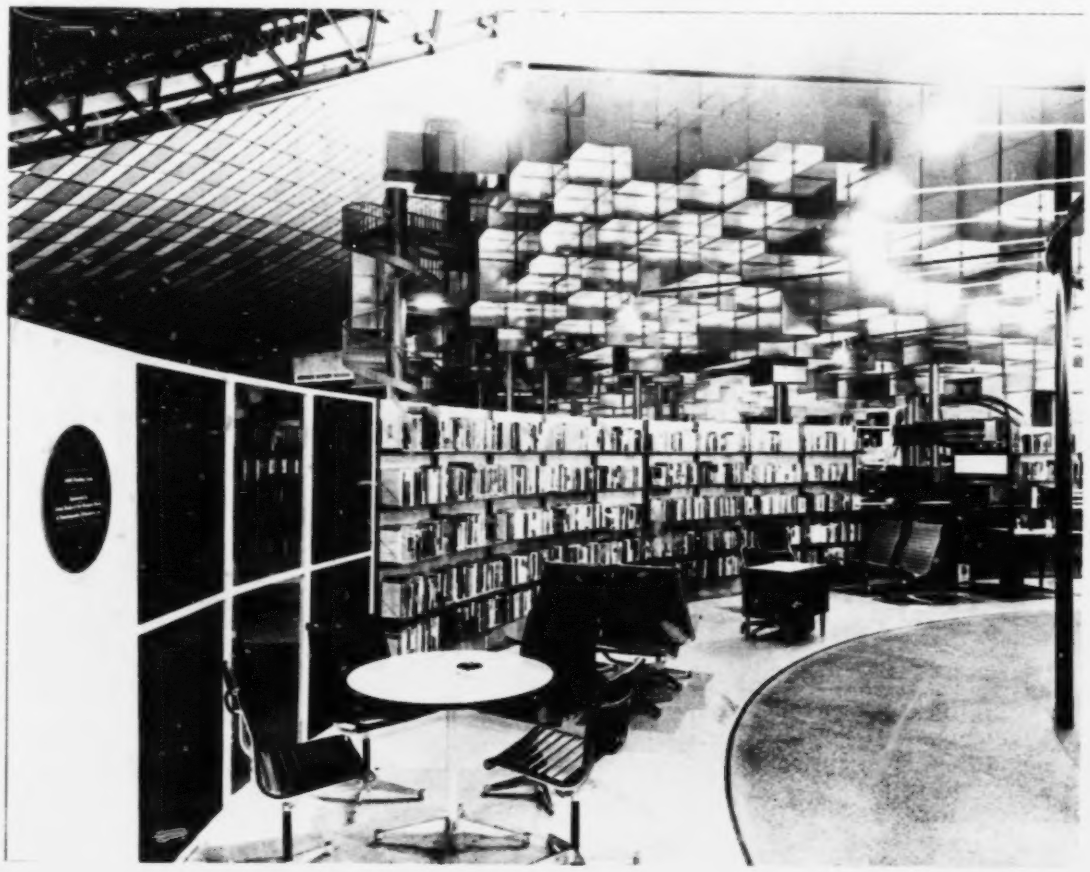


Figure 5
Learning Resources Center, sponsored by U.S. Office of Education
Photo by Martin

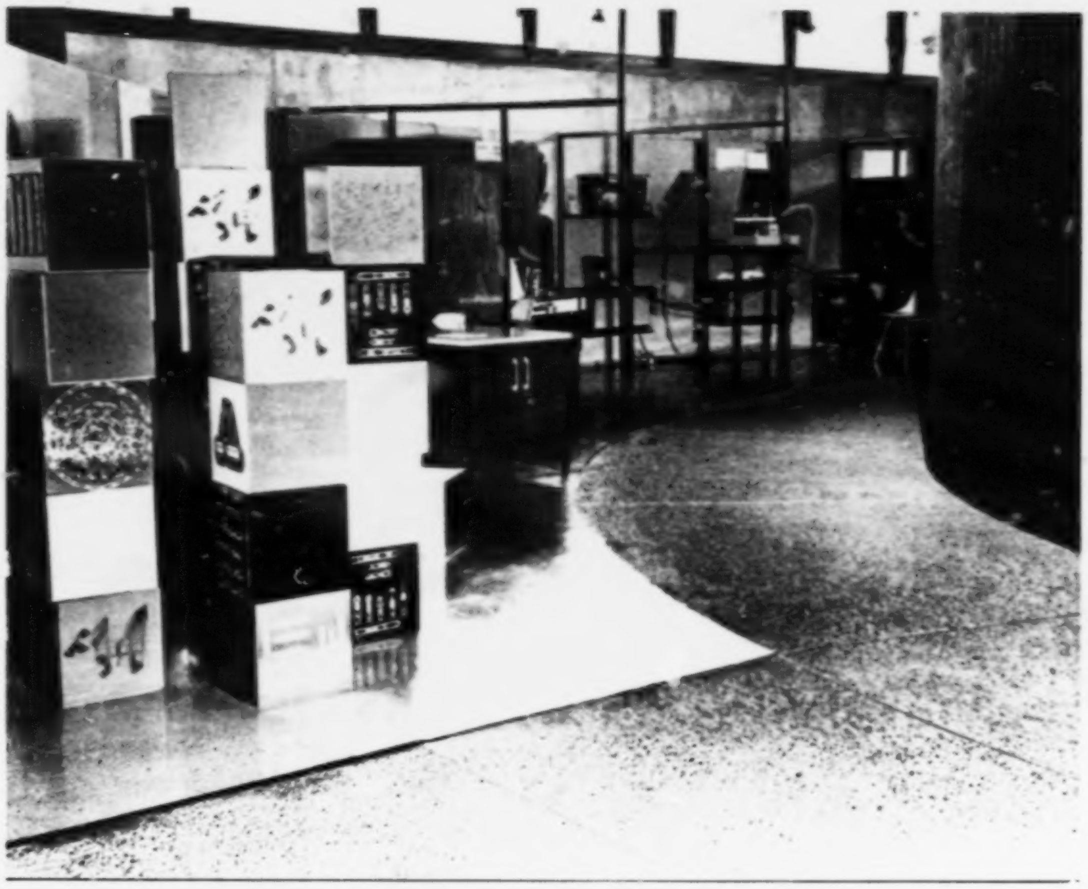


Figure 6
Learning Resources Center, showing model individual study space, or "quest" space.
Photo by Martin

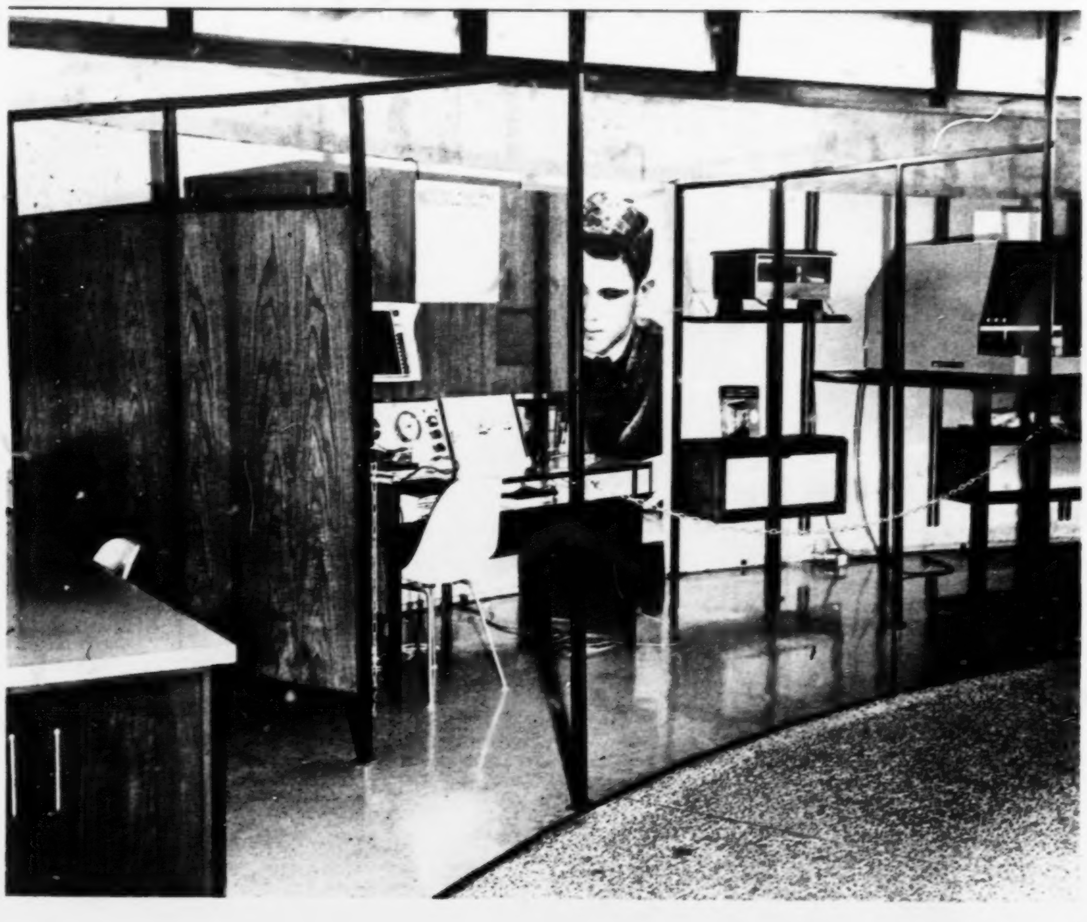


Figure 7
Learning Resources Center, showing equipment available to public.
Photo by Martin

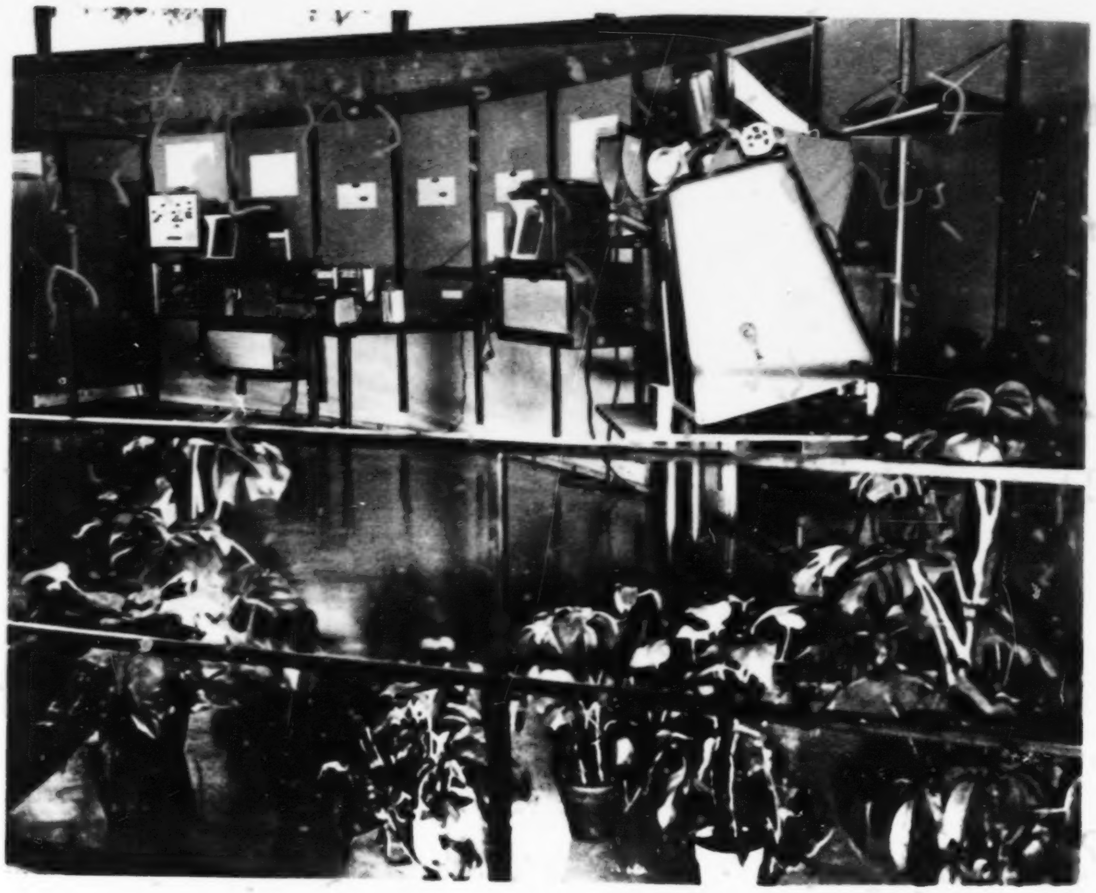


Figure 8
Xerox Theatre. Film entitled "Library 21", shown by a six-projector technique, was exhibited every fifteen minutes during the day. Theatre sponsored by the Xerox Corporation.
Photo by Morley

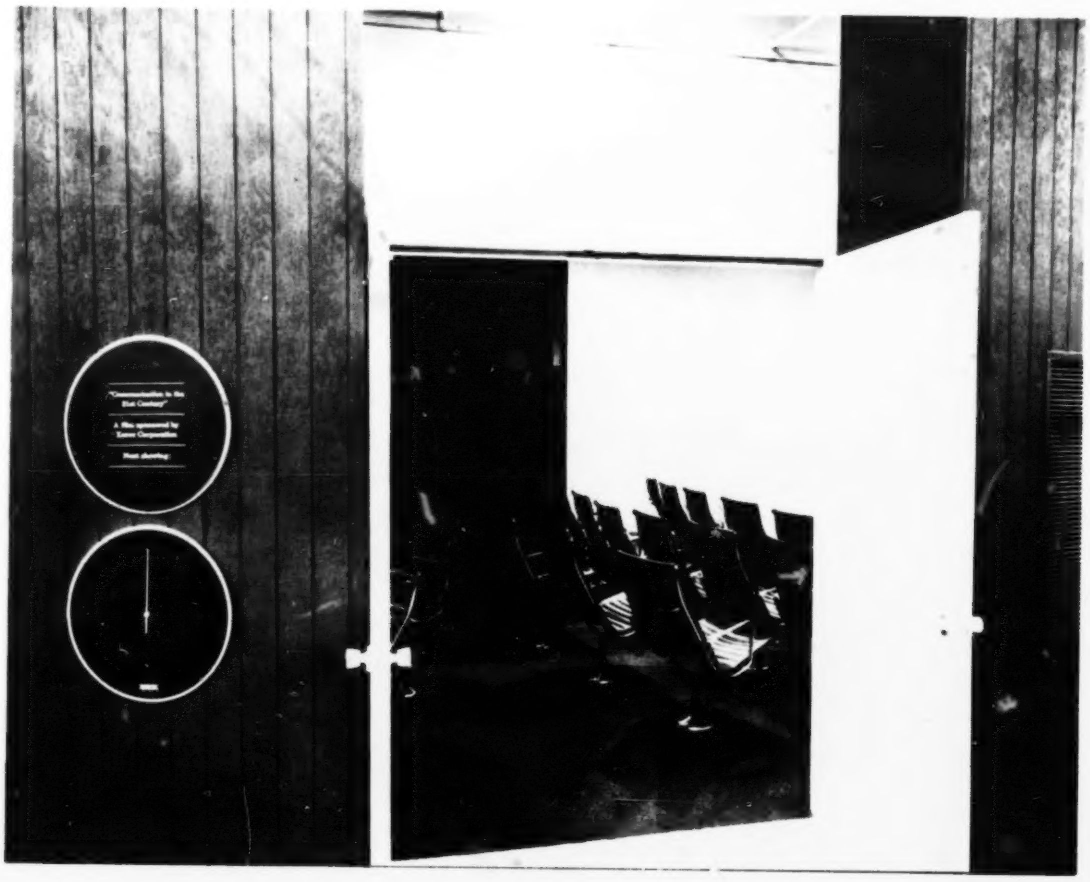

"Communication in the 21st Century"
A film sponsored by Xerox Corporation
Next showing:

Figure 9
Global Library System display sponsored by Radio Corporation of America, and the Photochromic Micro-images display sponsored by National Cash Register Company.
Photo by Morley

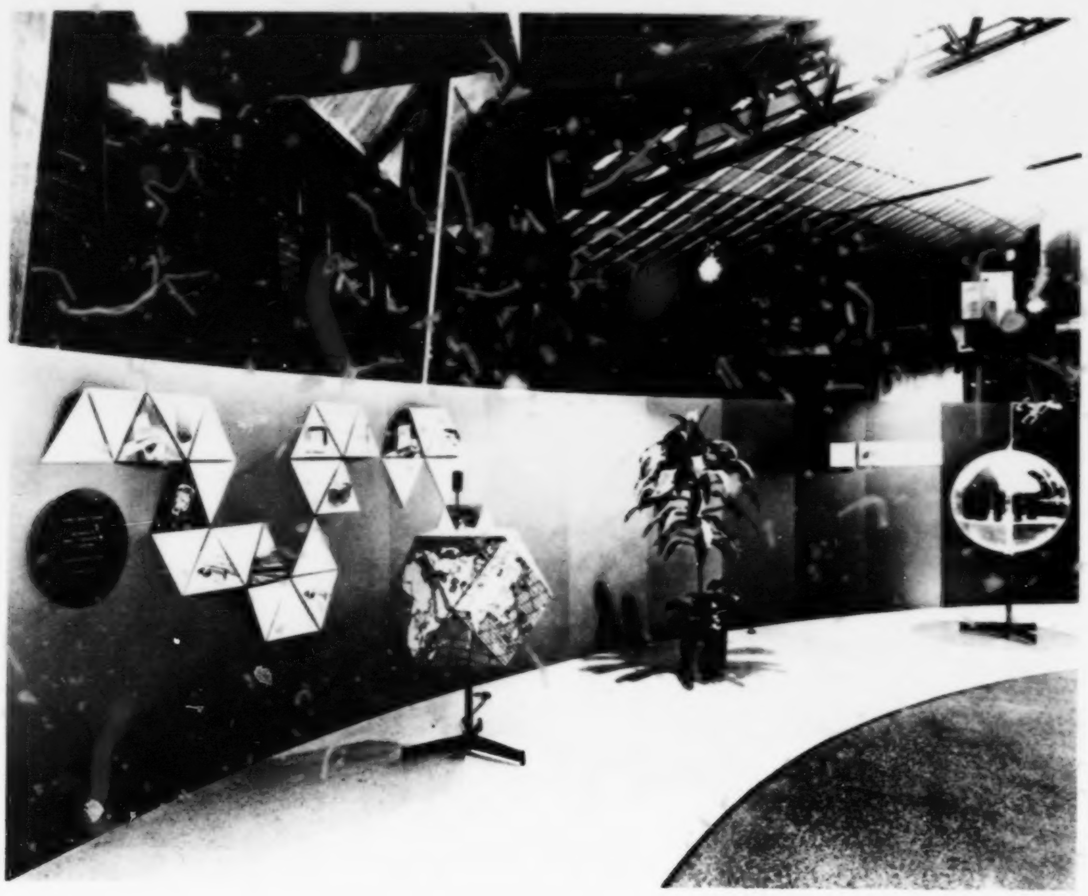
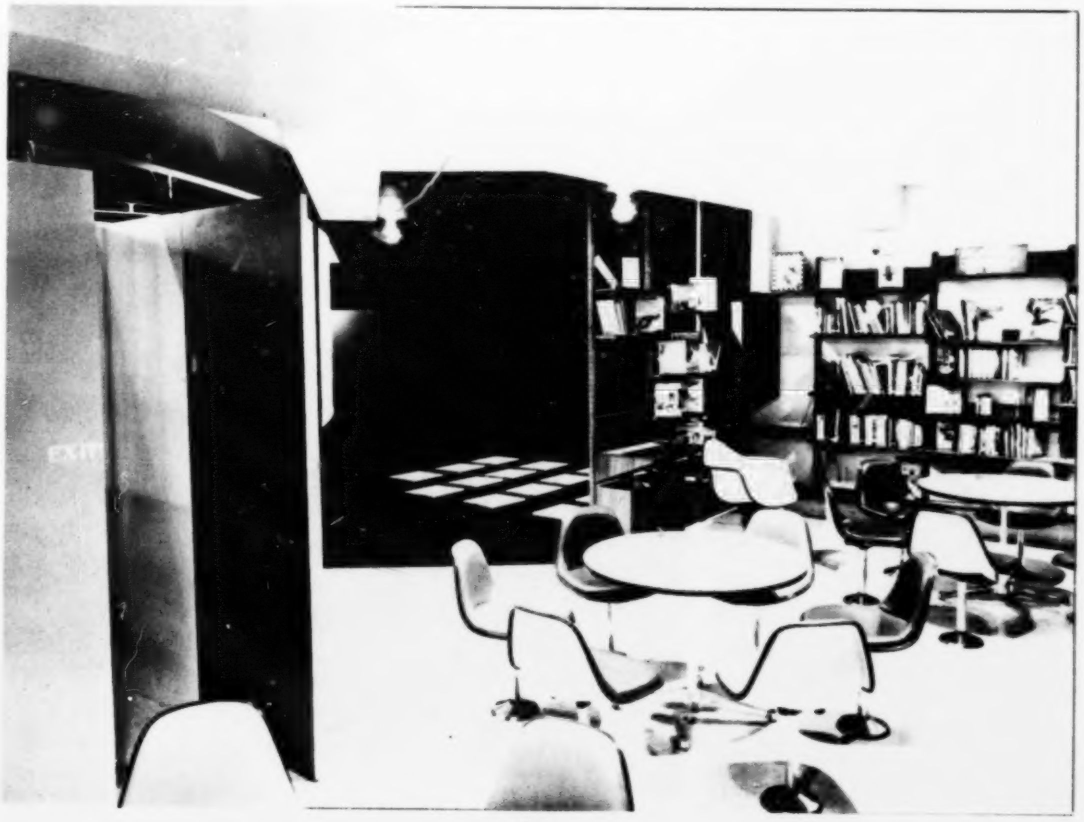


Figure 10
The Children's World, sponsored by the Children's Services Division, ALA. The foreground shows the reading area, in the distance the small theatre, and at the left the exit from the maze.
Photo by Morley



SECTION II

LIBRARY 21 INSTRUCTIONAL PROGRAM

By

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INTRODUCTION

The LIBRARY 21 week-long instructional program was designed to accomplish three purposes:

1. To provide the professional librarian exhibit personnel with sufficient familiarity with the equipment so that they could answer questions concerning it with confidence.
2. To provide these same people with the view of this equipment as a tool to be exploited by the library and thus to guarantee that they would present this equipment to the public in the framework of the library picture. In this way the exhibit becomes a library exhibit and not an equipment exhibit. It is only the professional librarians that are directly in the position to present this picture.
3. To imbue these professional personnel with a knowledge and enthusiasm about the potentialities of data processing equipment as a tool in the library so that when they return to their homes scattered throughout the country, they will examine their own libraries' needs critically and without fear concerning the effects of technology.

In a sense, the whole purpose of the educational program can be summed in one phrase: to remove the mystery from the field of data processing.

Now, as to whether these purposes have been achieved, only the evaluations of the professional library personnel can define. These are summarized in Section I. We can here, however, comment on the quality and character of the professional library personnel who have participated in the training program. It has been exceptional. These people have all met the highest standards of appearance, personal character, intelligence, and responsiveness. The library profession can indeed be proud of the picture which these people must have presented to the public.

Many of the participants came into the course of training with virtually no previous contact with equipment or knowledge of its capabilities. They seemed to leave the course with a real appreciation of the role which equipment could play. In large part, this appreciation was probably generated through interaction with those participants with extensive experience in the use of equipment. That is, a small percentage, perhaps one-fifth of the participants, have been working with systems mechanized to some extent, and they brought their experience to the class. They showed the extent to which equipment can be a tool in the library more than any degree of classroom instruction alone might have.

In fact, the startling thing is the extent of practical experience with mechanized systems in the library which exists in the library profession and yet which is so little discussed. It seems that, based on the experience in these classes, the ALA should undertake an active program of bringing together the knowledge and experience of its own members.

COURSE CONTENT

The emphasis of the course content itself was on the characteristics of equipment applicable to the library. The areas of application included both the clerical functions which might be mechanized and those functions, such as information retrieval, with more intellectual content. This was approached by describing the intellectual tools (including not only computer programming but documentation techniques and traditional library tools) as they would be utilized with equipment. Since clerical processes are not usually difficult in their conception, the emphasis of the course was on information retrieval. I should point out, however, that a course with more practical content would probably be of greater utility in any situation other than the specialized one of LIBRARY 21. The course content is summarized in outline form in the syllabus in Appendix A to this section. Following that is Appendix B, the summary introduction which was given to each class. Appendix C presents the visual material used to support classroom instruction. Appendix D is an introductory reading list set aside for the staff.

THE PROFESSIONAL CHALLENGE OF AUTOMATION

The impact of automation on information retrieval has broad implications, not only for the retrieval of literature but throughout our modern society, in business, and in government. Data processing equipment is being used more and more for the mechanization of very large files in a great variety of different areas. The need for competent professional knowledge about the handling of large files of information is very evident now, and will become increasingly significant. This knowledge of how to organize information and how to communicate with it is a professional capability that the library profession is almost certainly the most qualified to provide.

It is this which represents to the library profession a tremendous challenge and opportunity. The discipline of librarianship is one with utility far greater than the present scope of librarianship. By viewing this discipline in its largest context, the library profession will enormously expand the scope of its potential activity. All that is really required is a willingness to accept this challenge and the opportunity that goes with it.

The challenge, of course, lies in the need to grow, not only in terms of numbers of people, but in terms of their breadth of knowledge. This means that the library schools must extend their curricula to provide professional training in those topics which I have been discussing. It means that in the professional activities of the library associations there must be an increasing awareness of, and interest in, the potentialities of equipment. It means that in their own areas of professional work each librarian must be actively aware of the significance which these new developments have in his own situation. The course attempted to make evident the opportunity which the computer has now made available to the library profession.

There are probably those who question whether such a change is possible, or even desirable. For example, it might well be asked whether personnel with the technical capabilities required to meet this challenge can be attracted to the library profession. I am certain that they can. Certainly the number of mathematicians has increased enormously over the last ten years, not because people are any more capable of mathematics than they previously were, but rather that they are attracted to the profession because of the increased opportunities available in it.

The question of the desirability of the library profession extending the meaning and scope of its work is certainly more fundamental. The library profession has long had important traditions, and the opportunity I am describing may, to a large extent, seem incompatible with them. I can only say that what I am suggesting is a broadening of the scope and character of your work, not the loss of any principles of your present professional work. Although mathematicians have assumed important roles in government and industry, other mathematicians are still doing research and still teaching in the colleges and universities of our country. By the same token, even if librarians assume increased roles in the design and management of large files of information, there will continue to be other librarians in the schools, colleges, and cities of our country.

Furthermore, with the changing character of the library itself, as visualized in the Information Center of the 21st Century projected in the ALA report to Rome Air Development Center, the challenge to the library profession becomes even greater. As that report described, areas of conventional library service are likely to undergo change as they evolve into a 21st Century Information Center. These areas may be categorized as Special Services, Information Services, and Technical Services. Special Services will include the variety of new techniques that will be introduced to satisfy the particular needs of special interest groups; Information Services will include the diverse methods and techniques of storage and retrieval available for general reference use; and, Technical Services will embrace the application of equipment to behind-the-scenes library processing operations. In the special services area, improved facilities for the handicapped, in arts and music, and in self-education will certainly be part of the changing character of the new information system. The changes in the information services area are recognized as the heart of the advanced techniques available in the Electronic Information Center and the ones which, through machine information storage and retrieval, will supplement and strengthen what we today recognize as conventional library reference activities. This area concerns itself largely with access to information stored in digital form and available in the same form for communication to and from remote points.

Four functions can be described to paint the picture of what may happen in this area. These are:

1. Remote inquiry and automatic catalogue search.

2. Personalized bibliographies.

3. Display of facts and statistics.

4. Machine translation.

In the technical services area, micro storage, document reproduction, displays, automatic handling, and computer analysis will all result in a drastically changed character of service.

As projected in the ALA report, regional and satellite information centers, the library of the future, will equally serve the entire population from farmers, lawyers, teachers, doctors, businessmen, students, housewives to skilled and non-skilled laborers. The entire library complex will be capable of handling all requests from individual answers to specific inquiries to the delivery of an entire literary volume. For the most part, all requests will be accepted simultaneously with the assistance of large core, real time computers. The response to these requests will be staggered according to priority, length of reply, and availability of the material.

The greatest effect of the library of the future will be on the library staff itself. Inasmuch as these people will be the voice of the library of the future, their knowledge and training will influence the general public greatly. In addition to the classical requirements of librarianship, the staff of the library of the future will need to have a broad liberal and scientific education in information retrieval theory and practice, knowledge of machines and systems, and the relationship of the human to the machine. The ultimate worth of the library of the future, will, as it has in the past, rest strongly on the capabilities of these people.

AUTOMATION AS A TOOL IN PRESENT-DAY LIBRARIES

An analogy can be drawn between the utilization of data processing equipment in business and in libraries, Ten years ago, when the potentialities of modern computers were being explored by business, the principal emphasis was on the computing capabilities and, therefore, on how these computing capabilities could be utilized in business. The result was that operations research and scientific management became the dominant application. Although this type of work has been successfully exploited by the military and was similarly successful in several specialized businesses, for most companies, it did not represent a fruitful application of the computer. The reasons for this were many: For some businesses, operations research was just not a useful tool. For other businesses, even though it may have been a useful tool, the information necessary for its application was not available in mechanized form. In several cases of the latter type, computers were, in fact, sold on the basis of the potential benefits to be derived from scientific management, but the costs of getting the information into mechanized form were so great and the errors in that information so many that rarely were the benefits sufficient to pay the costs.

The analogy that I wish to draw is between operations research in business and the "information retrieval" in the library. Both are concepts which attempt to handle processes with a large content of human judgment through mechanized routine processing. They each have a very high potential benefit. They each require vast amounts of data in mechanized form.

The library profession has a lesson to learn from this experience. Just as the military found use for operations research, so the military has found use for information retrieval. Just as certain businesses were able to derive benefits directly from operations research itself, so too will some libraries directly derive benefits from information retrieval. But for the great mass of businesses and of libraries, the costs of establishing systems of this intellectual complexity, and particularly the costs of putting the necessary information into mechanized form, are greater than the potential benefits to be directly derived from them.

Does this mean that computers have no use in such businesses or libraries? Again the library profession can learn from the experience of business. Computers have been successfully used in companies of a broad range in size, but the major benefits of the computer in business have been in the mechanization of simple clerical processes -- bookkeeping, inventory control, pay roll, etc. The same thing should be true of libraries. Libraries throughout the country, great and small, should find benefit from the use of the computer and other data processing equipment for the mechanization of the clerical processes in the library. The resulting savings in cost and time and improved efficiency of operation should more than pay for the cost of the equipment.

It turns out that there is an additional, fringe benefit. As a result of mechanizing the clerical processes, the information necessary for scientific management in business, on the one hand, and information retrieval in the library on the other, is now in mechanized form. Thus, the operations research or the information retrieval becomes almost a free benefit resulting from the mechanization of clerical processes.

What then is the status of mechanization of clerical processes in the library, and how can the benefits of data processing be extended to all of the libraries in the country? There is a growing recognition of the need to assist libraries in improving their clerical processing activities. Within several individual libraries, there have been projects to mechanize specific clerical areas such as the mechanized production of catalogs, mechanized control of periodicals, mechanized procedures for circulation control, etc. Several activities have undertaken programs to integrate clerical processes of this kind into a single system. There is, therefore, much knowledge presently available in the library profession.

There are, however, some difficulties in bringing the mechanization of clerical processes to most libraries in the country. The knowledge concerning existing projects is highly fragmentary, and the solutions have tended to be piecemeal, with a concentration upon a part of the library's operation. The relatively high demand for competent systems analysts has placed them in short supply and beyond the reach of most libraries. The time seems right to develop a handbook of data processing for library use. By making a single collection of the information, the coverage can be quite broad. Thus, a few competent analysts can bring all their knowledge to bear in the production of the handbook, rather than having more analysts applying small portions of knowledge to individual systems. Such a handbook is needed to communicate to the nation's libraries the economic and operational significance of developments in the techniques of data processing and to assist them in determining how, and whether, to apply these techniques to their own systems.

LIST OF APPENDICES

A. Syllabus for the Educational Program

B. Introduction to Information Retrieval and Librarianship

C. Visual Material in Support of Educational Program

D. Selected Reading List

APPENDIX A TO SECTION II

SYLLABUS FOR THE EDUCATIONAL PROGRAM

The following is an outline of the course content presented as a syllabus for the students. It differs from the syllabus distributed in that it reflects the approximate time actually devoted to each aspect of the course content.

Sunday	
4:00 PM - 5:00 PM	Registration
5:00 PM	Social evening and general seminar on LIBRARY 21 Program, including introduction of participants and staff (Lieberman, Martin, Hayes).
Monday	
8:30 AM - 9:30 AM	Tour of exhibit - run through of entire exhibit to define layout, content, location of significant features, etc.
9:30 AM - 10:00 AM	Identification
10:00 AM - 12:00 Noon	Tour of Fair
2:00 PM - 5:00 PM	

AUTOMATION IN THE LIBRARY

- I. Mechanization of Clerical Processes
  - A. Characteristics of Library Data Processing Tasks
    - 1. Budget and control
    - 2. Document ordering control
    - 3. Catalog maintenance
    - 4. Dissemination and circulation control
    - 5. Others
  - B. Characteristics of Equipment
    - 1. Semi-automatic systems
    - 2. Punched card systems
    - 3. Computer systems
  - C. Availability of Data Processing Facilities
    - 1. Library controlled
    - 2. Shared
    - 3. Service Center
    - 4. Others
  - D. Types of Libraries
- II. Introduction to Documentation Techniques
  - A. Importance of Communication
  - B. Areas of Responsibility
    - 1. User
    - 2. Operator
    - 3. Designer
    - 4. Supplier of equipment

- III. Elements of Usage
  - A. Overlap Between User and Operator
  - B. Definition of Purpose
  - C. Criteria of Value
  - D. Definition of the General User
  - E. Definition of the Individual Request
    - 1. Precision of the request and of the information desired
    - 2. Complexity of the request, of information desired, and relation of complexity to theory

Tuesday
8:30 AM - 12:00 Noon

DOCUMENTATION

- IV. Summary of Documentation Schools
  - A. Traditional Library
  - B. Coordination of Ideas
  - C. Efficient Storage of Codes
  - D. Analytical Abstracts
  - E. Analytical Classification

1:00 PM - 5:00 PM

- V. Elements of Organization
  - A. Overlap Between Operator and Designer
  - B. Organization of Items
    - 1. Information handling
    - 2. Levels of abstracting
    - 3. Item representation
    - 4. Item storage
    - 5. Item subdivision into data types
  - C. Organization of Files - Physical Aspects of Recovery
    - 1. General
    - 2. Gross organization
    - 3. Characteristics of given stages
  - D. Organization of Processes
    - 1. General
    - 2. Input
    - 3. Posting
    - 4. Repetitive handling of non-file items
    - 5. Repetitive handling of file
    - 6. Computing and special situation handling
    - 7. Output
  - E. Organization of Response
  - F. Organization of Equipment and Personnel
    - 1. Assignment of tasks
    - 2. Communication with machine
    - 3. Judgment

ELEMENTS OF EQUIPMENT

- VI. Introduction and Summary
  - A. Printed Data and Conversion to Machine Language
  - B. Logical Processing and the Computer
  - C. Storage of Data

Wednesday
8:30 AM - 12:00 Noon

ELEMENTS OF EQUIPMENT (continued)

- VII. Printed Data and Conversion to Machine Language
  - A. Primary Publishing
    - 1. Letter press and composition
    - 2. Offset and photo-composition
    - 3. Intaglio
  - B. Office Duplication
    - 1. Spirit and stencil duplication
    - 2. Photocopy and direct contact copying
    - 3. Output printers
    - 4. Punched card composition
    - 5. Xerography
  - C. Machine Language
    - 1. Binary coding
    - 2. Binary representation
    - 3. Decimal representation
    - 4. Alphanumeric representation
  - D. Conversion to Machine Language

1:00 PM - 5:00 PM

- VIII. Storage Media, Handling, and Filing Equipment
  - A. Physical Nature of Medium
    - 1. Size considerations
    - 2. Topology
    - 3. Inherent resolution
    - 4. Stability and life
  - B. Qualitative Nature of Reading and Recording
    - 1. Summary charts
    - 2. Combination of storage forms
    - 3. Erasability
    - 4. Direct usability of recorded data
  - C. Quantitative Nature of Reading and Recording
    - 1. Information rate
    - 2. Unit record capacity
    - 3. Required tolerances
    - 4. Information blocking
  - D. Handling Equipment
  - E. Filing Equipment

Thursday
8:00 AM - 12:00 Noon

ELEMENTS OF EQUIPMENT (continued)

- IX. Perforated Recordings
  - A. Punched Tape
  - B. Edge Notched Cards
  - C. Manual Punched Cards
  - D. Electronic Accounting Machine Punched Cards
- X. Magnetic Recording
  - A. Introduction
    - 1. Magnetism and electricity
    - 2. Storage of digital information
    - 3. Recording audio, video, and other analog information
  - B. Magnetic Drums
  - C. Magnetic Tape
  - D. Magnetic Discs
    - 1. Indexed or "random access" memory
    - 2. Description of memories
  - E. Magnetic Cards and Strips
    - 1. Magnacard and NCR CRAM
    - 2. Burroughs Data File and Facit Carousel
    - 3. Compromise between problems and advantages of scanning and physical indexing, activity organization
- XI. Micro-Photography
  - A. Microfilm
    - 1. Linear access
    - 2. Rapid Selector, FLIP, and FMA FileSearch
  - B. Micro-image Cards and Strips
    - 1. Microcard and aperture card
    - 2. Minicard, Filmorex, and MEDIA
    - 3. WALNUT
- XII. Newer Recording Media
  - A. Photochromics
  - B. Thermoplastics

1:00 PM - 5:00 PM

ELEMENTS OF EQUIPMENT (continued)

- XIII. Analysis, Logical Processing, and the Computer
  - 1. Intellectual processes
  - 2. Document analysis processes
  - 3. Index content
  - 4. Handling requests
  - 5. Standardized indexing schemes
  - 6. Testing of EDP for development of mechanized solution
- XIV. The General Purpose Computer
  - A. Introduction

- B. Structure of the Computer
  - 1. Description of computer system
  - 2. Command
  - 3. Commands stored
  - 4. Built-in operations
- C. Programming
- D. Subroutines
  - 1. For numerical computation
  - 2. For handling alphanumeric data
  - 3. For language data processing
  - 4. To simulate human thinking processes
- E. Compilers and the Extension of Built-in Capabilities
  - 1. Compilers defined
  - 2. Development and use of a compiler
  - 3. Specialized languages - ALGOL, COBOL, IPL, ---

Friday
8:00 AM - 12:00 Noon

ELEMENTS OF EQUIPMENT (continued)

XV. Programs for Analysis and Logical Processing

- A. Computer Searching Experiments
  - 1. Scan and compare
  - 2. Tillitt's experiment on IBM 704
  - 3. Moyer's search system on IBM 705
  - 4. Comparison of Tillitt and Moyer methods
  - 5. Barton and Caplan two-part tape system
  - 6. Maron and Kuhns measure of relevancy
  - 7. NBS atom-to-atom match
- B. Computer Indexing Experiments
  - 1. Automatic Indexing
  - 2. Auto-abstract
  - 3. Oswald's multiterms
  - 4. Baxendale's prepositional phrase
- C. Language Data Processing
  - 1. Mechanized languate translation
  - 2. Word-by-word or complete sentence analysis
  - 3. Program size and dictionary size
  - 4. Two approaches - successive approximation and scholastic
  - 5. Evaluation of machine translation
- D. Automatic File Organization
  - 1. Traditional classification
  - 2. Computer generated indexes
  - 3. Computer program for sorting and posting terms
  - 4. Permutation index
  - 5. Automatic grouping

1:00 PM - 5:00 PM

LIBRARY OF THE FUTURE - A DISPLAY

XVI. Learning Resources Center
  A. Teaching Machines
  B. Language Laboratories
XVII. Advanced Technology
XVIII. Review of Exhibits and Course Material

APPENDIX B TO SECTION II

INTRODUCTION TO INFORMATION RETRIEVAL AND LIBRARIANSHIP

The following is the summary introduction to the course which was presented to each class.

INTRODUCTION

Information retrieval is a broad term covering such diverse topics as library operation, document abstracting, microfilming, machine translation, printing, computer searching, index publishing. In these areas, automation has made possible the solution of problems which previously could not be handled. Of equal significance, since automated equipment requires a precision in definition of what is to be done and a degree of efficiency in operation far beyond those required of manual systems, automation has also forced a concentrated re-examination of a host of questions about information, how to represent it, and how to organize it.

As a result, some of the aspects of the impact of technology on information retrieval are practical, some of them are theoretical. Some of the aspects are concerned with the design and development of equipment, some of them with the problem of how to use it. Some of the aspects are associated with subject matter which is to be retrieved, and some of them are independent of it. I want to show these aspects by reviewing the developments which have taken place in each of many areas of work. But, before doing this, I should try to describe why this technological revolution has taken place in information retrieval.

Information retrieval is certainly not a new concept; it is an integral part of the communication process. Knowledge has been recorded throughout the ages, and techniques and methods for storing and retrieving it have long been available. Yet, during the last several years, the size of some information retrieval tasks has become greater than previous techniques could handle. Equally important, the tools for new techniques seem to be available in modern data processing equipment. The computers, photographic processes, and magnetic recording developed over the past twenty years provide, in a very tantalizing way, a capability for solution of information retrieval problems -- a capability comparable to that given to the scientist in the solution of his computing problems and to the businessman in the solution of his data processing problems.

Information retrieval tasks where these new techniques seem necessary have been characterized by the feature of extremely rapid growth. It has been pointed out that information today is produced and disseminated in such vast quantities that human effort may be wasted over and over again, simply because it is not possible to determine what work has already been done. On the other hand, mere volume alone would not, in itself, be sufficient to warrant new approaches. It is also the growing specialization in the evident value of any particular piece of information and the high probability that eventually the same information will have value in other areas which really creates a problem. The growth of specialization is a well-recognized phenomenon which is probably an essential part of the solution of complex decision-making problems. Yet, the effects of specialization are to create specialized terminology, to limit the area of direct communication, and to make accessibility outside the specialized field increasingly difficult. Although a paper in one area may well contain information valuable to a decision in some very different area, the specialization of both the subject field and the language lays almost insurmountable barriers to the recognition of this value.

Illustrations of these problems in science and technology are readily at hand. The exponential growth of the scientific publishing rate has already been pointed out. The specialization of scientific disciplines is well recognized. The multiple application of information is evident in the growth of inter-disciplinary fields such as biochemistry or mathematical psychology.

It must also be emphasized that they are equally apparent in business and government. The flood of paper work in modern industrial and governmental organizations is well recognized, and both specialization and multiple usage of information are also very evident in business and government. Thus, although most of the rationale for work in the field of information retrieval has been based on the needs of science and technology, these other areas partake of the same characteristics and will benefit in much the same way.

THE PRESENT STATE OF DEVELOPMENT

The cause of the great explosion of activity in the area of information system design is the combination of complex, critical, decision-making problems with the appearance of the machines which seem to be capable of aiding in their solution. The result has been the focusing of a wealth of talents, theories, and technical efforts on fundamental problems in the nature of recorded information. These problems can perhaps be best described in terms of a dichotomy information retrieval is simultaneously an intellectual process and a physical one. Most of the problems in the field arise from the need to solve simultaneously the difficulties in each type of process.

The importance of physical considerations in information retrieval can perhaps best be illustrated by a review of the developments of equipment for storage of data which have taken place over the last several years. Each one of them has provided an extension in physical capabilities of almost unbelievable proportions. To place these developments in some perspective, they can be compared with the printed page as a storage medium. The printed page might contain about 500 words. A man can read these words at a rate up to, at most, 15 words per second, and he could probably find a single numbered page, from an ordered sequence of 10,000 of them, in a few minutes. It is interesting, then, to compare these capacities, reading speeds, and access times with those of mechanized storage media.

Probably the most versatile developments have been in magnetic recording, familiar to most people in the tapes used for home recording of music and voices. It is now most widely seen in computer installations in the form of magnetic tape, where individual characters or words are stored as codes of magnetic pulses. Present day magnetic tapes can store in this way a number of words equivalent to those 10,000 printed pages on a tape 2400' long stored on a reel approximately 1/2" wide and 1' in diameter. The information which the man would read from the printed page at perhaps 15 words per second, magnetic tape handling equipment will scan at 15,000 words per second. The result is that the entire information from those 10,000 pages can be completely scanned in less than four minutes.

Magnetic tape has one operational limitation -- the access time to any single block of data, such as the equivalent of a page, also takes on the order of a few minutes, as it would for the man indexing to the same page. The engineers and manufacturers therefore looked for a storage medium, still utilizing the principles of magnetic recording, which would provide comparable total capacity and reading rate, but would provide access to individual small blocks of data in tenths of a second compared with the minutes required by the man or the magnetic tape handler. Present day magnetic disc memories, similar in their operation to automatic record players, provide these capabilities.

Both magnetic tapes and discs, however, still suffer in comparison with the individual page in one respect -- while pages can be physically rearranged, the information on magnetic discs and tapes must be re-written in order to be similarly re-arranged. Therefore, several manufacturers have developed, and now have available, unitized magnetic media in the form of various sizes of cards. Files of these cards provide capacities and information rates comparable to those of magnetic tapes and discs but provide the additional capability for physically re-arranging the cards.

Thus, magnetic recordings in one form or another provides storage densities greater, reading rates faster, and access time shorter by several orders of magnitude than those of the man using the printed page. But great though the extension in capability represented by magnetic recording has been, it is pale beside that represented by photographic recording. For example, using the most conventional reduction ratios at the present time, approximately 30 to 1, that same set of 10,000 pages could be stored on a strip of microfilm 16 mm. wide and 200' long as compared with the 2400' for magnetic tape recording. More recent developments, using photographic discs and plates, involve reduction ratios of 100 or 200 to 1, with consequent increase in storage density. In each case, equipment exists which can provide indexed access to individual images in a few seconds.

The information stored on each page in conventional microfilm systems would, of course, need to be found and read by a human being. This led several manufacturers to consider methods by which a machine could provide a preliminary reading of identifying data to mechanically select frames which were probably of interest, thus reducing the amount of material which the human being would need to examine. The earliest such device was the Rapid Selector, which provided for each page image a set of optically coded information identifying, in a mechanized form, the information content of that page. The mechanical searching device would then scan the identifying data for each frame at the rate of 40 pages per second and provide copies of selected pages for later viewing. Since the development of the Rapid Selector in the early 1950's, several commercially available devices of a similar nature have appeared.

The engineers and manufacturers recognized that microfilm recording suffers from the same basic operational disadvantage as magnetic tape or any other continuous medium: it is awkward to inter-file new material in an orderly sequence or to re-arrange old material, and the searching mechanism must, therefore, examine the entire file to satisfy a search request. Therefore, several engineering developments considered methods of mechanizing unitized film files. Several ways now exist for placing micro-reductions of documents on cards, thus providing not only the storage density of micro-recording, but also the capability of flexible re-arrangement.

The micro-card and micro-fiche are familiar extensions in this way of conventional microfilming. Of a far more spectacular character has been the Minicard development which not only provided the unitized capability of cards but also substantially extended the reduction ratio, the reading rates, and the access times. The existing Minicard equipment would store the pages together with identifying coded data, at a reduction ratio of 60 to 1, on cards containing up to 12 document pages. These 10,000 pages we've talked about might then be stored on a set of 2,000 cards and would occupy a space 33 mm. x 16 mm. x 30 cm. The Minicard equipment would scan through these 2,000 cards, reading the coded data and selecting the desired pages, in 3 to 4 minutes.

An entirely different approach to unitized microphotographic storage is a film strip technique, called Walnut, providing comparable capacities, scanning rates, and access times. This approach is of additional importance, however, because it represents another direction in which technological advances have been made. Specifically, this technique utilizes a photosensitive emulsion, called Kalvar, different from the silver halides or diazos used in most microphotographic processes. It involves a completely dry, self-contained process for exposure and development, since the image is exposed through ultra violet light and then developed through heat. Other, newer, photosensitive emulsions, such as the photochromic and the thermoplastic, provide the possibilities of even more spectacular extensions in the technology of recorded information.

The engineers and manufacturers are striving continually to increase the storage density and the scanning rates for recorded information, to provide access to portions of it in shorter and shorter times, and to make it easier to manipulate, change, and re-arrange the information recorded. In one sense, therefore, it is the revolution in the technology of recording information which has made possible the mechanized solution of information retrieval problems.

On the other hand, the ability to record information at high density and to scan it at high speed would have no significance without a comparable ability to process that information. It is here that the intellectual problem now becomes evident. Recognizing that modern methods of recording provides fantastic capabilities, can information, with all of its intellectual content, be handled mechanically? It has been seriously questioned whether, in fact, it is even possible to manipulate language, the very fabric of human communication, in this way. But, even assuming that it is possible to do so, the problem is still how.

It is here, of course, that the general purpose computer, with its inherent capability for flexible processing of signals -- even to the point of self-modification of its own program so as to adjust to change -- enters the picture. To solve any task, and in particular the manipulation of language, such machines must be provided with precise detailed definition, in the form of their programs of operation, of every individual mechanical step. To provide this definition, linquists, logicians, mathematicians, psychologists, librarians have all been focusing their attention on the problems in language data processing.

Perhaps the best example of this work is represented by the experimental work on mechanical translation from one language to another. Various operating programs exemplify many different approaches to the structure of language and differing philosophies concerning how to program machinery to handle language. For example, one philosophical difference concerns the analysis of individual words. At one extreme is the extensive use of a dictionary, which would store all variant forms of each word; this is to be contrasted with the analysis of individual words into their roots and stems. Another division in approach concerns the treatment of syntax. The contrast is between the sequential analysis of strings of words, which essentially handles a sentence one word at a time, and phrase analysis, which starts by determining the structural parts of the sentence. A third division in approach concerns the methodology. The choice is between the empirical approach which, at the extreme, handles any difficulties only when they arise, and the analytical approach which attempts to understand the complete structure of the language involved before attempting any translation.

Some of the resulting computer programs embody, for the first time in a concrete form, theoretical concepts at the very foundation of logic and mathematics. They have therefore provided a vehicle for experimentation in the syntatic structure of languages from the most simple to some which are near approximations to the language of normal discourse. Whether such programs can ever produce high quality translations, comparable say to those of a trained linguist, is dubious. But it is certainly evident that the experience gained on these studies has provided an improved insight into the intellectual problems in handling language and a cross fertilization of the several different approaches to them.

Since information retrieval must deal with information expressed in a language of some kind, the major efforts of those investigators concerned with information retrieval have paralled and interacted with those concerned with language data processing. The documentalists, the librarians, the information specialists in specific scientific disciplines have each been concerned with the development of specialized languages designed for particular problems. Most of these languages represent intermediate steps between man's understanding of documents and the machine's mechanical handling of them.

In a sense, traditional library classifications are such intermediate languages; in fact any of them is eminently suited to mechanical processing. The only proviso concerns the extent to which a particular classification adequately represents the usage which the system must meet. Since in many cases the classification has not been siffuciently adequate, the work of groups like Western Reserve University, Ranganathan, and others has been, in part, to develop languages which would exhibit relationships among words in more complicated or specialized ways than the traditional classifications. Some of these relations provide an a priori picture of the structure of the universe; some of them describe the syntactical structure of a particular situation. In each case, the resulting vocabulary of terms is one which the machine handles quite well and which will be efficient provided the structure of the usage coincides with the structure of the language.

In general, however, it is to be expected that no structured language will completely meet the usage of a file. Another approach, therefore, has been to provide intermediate languages which do not depend on a priori relations among words. For example, the set of subject headings in a library catalog, or other descriptive words standardized to one extent or another, tend to fit more closely the normal pattern of human communication. The trend has therefore been to use key-words -- descriptors as Calvin Mooers refers to them, Uniterms as Mortimer Taube calls them.

Languages based on key-words are far more difficult for a machine to handle, since most usage involves implicit relations among words. Therefore, these implicit inter-word relations must be described to the computer through dictionaries, thesauri, word association lists, etc. Much of this depends upon the statistics of word usage, and several efforts have been made to utilize such statistics in a direct way, as a heuristic or rule for the application of terms to documents or for the association of terms to each other. The most extensive effort of this kind is that by H. P. Luhn at IBM who has used statistics for both mechanical indexing and abstracting.

Whatever language may be used for representation of a document content, the problem remains of determining the relevancy of a particular document to a particular request. All that the chosen language can hope to do is to make it simple to determine this relevancy in most situations. One method which has been extensively exploited is based on the appearance of common terms in common logical relation. The structure of this method is implicit in all present computer programs for information retrieval. Part of its power is the elegance of the underlying mathematics of Boolean algebra and lattice theory. More recently, experiments have been made using quantitative measures such as the number of common terms or more complicated measures based on different values assigned to individual terms. This work is still exploratory, but results have been reported by several investigators including Maron and Stiles.

One of the most significant aspects which the concept of relevancy has is its effect upon the organization of documents. That is, the relative similarity of documents, according to the measure of relevancy, provides a criterion for grouping them and, in effect, for generating classification of them based on similarity rather than on a priori judgment. This approach is the foundation for all present methods of document grouping, including classification and coordinate indexing.

With all due respect to the significance of these intellectual considerations, I should again emphasize that information retrieval is also a physical process. Books, discs, tapes, cards -- all are physical media which occupy space, have weight, and must be moved. For intellectual processes to take place at all, the symbols recorded on these media must be scanned and the rate at which this can be done is limited by the physical nature of both the media and the methods of recording. Even the fastest method of scanning recorded information would be ineffective and uneconomic without organization. It is by sequencing files and by providing indexes and cross-indexes to them that economic operation is made possible. A manual file must provide such mechanisms. The fact that a computer might be able to scan the same file as a manual system at enormously faster rates does not eliminate the necessity of similar mechanisms for efficient search.

Viewed in these terms, information retrieval becomes a matter of matching the physical arrangement of a file to the pattern of activity on the file. The problems in indexing are then in generating efficient mechanisms for mechanical location of sections of the file which are to scanned. All of these problems are amenable to solution by existing methods in communication theory and mathematical models of physical efficiency. Unfortunately, the effect of the physical considerations of capacity, scanning rate, and access time upon organization of files has been virtually unexplored. Only recently have studies been made of the relation between them and the intellectual problems of language. In a sense, the siren's call of the problem of meaning has led people away from the more homely problem of efficiency. Yet, it would seem that, since efficient physical organization is a mechanical problem, it is one particularly appropriate to machine handling. Attack on these physical aspects of information retrieval may well cause some of the intellectual ones to vanish, as fog under the sun.

APPLICATIONS

Mechanized information systems are more than just collections of devices with interesting intellectual and physical aspects. They are operational solutions to critical information needs. The full significance of the problems that we have discussed become more evident when we look at the technical fields of science and engineering. In the fields of chemistry, metallurgy, medicine, drugs, electronics, space, equipment is being used more and more as a practical tool for the organization, retrieval, and presentation of information. The journal, Chemical Titles, is produced monthly, utilizing a computer for routine mechanical re-arrangement of titles. The American Society of Metallurgy provides a mechanized retrieval service in response to questions concerning the literature of metallurgy. The National Library of Medicine now produces Index Medicus, its monthly index to medical literature, utilizing punched card techniques and is well under way with a project to accomplish the same task with computers. This list of operating installations of equipment performing day-to-day service is being added to almost daily in technical field after technical field.

The U. S. Government, because of the extent of its interests in technical and scientific projects and the variety of programs for research it is supporting, has been particularly involved in these mechanization programs. The National Science Foundation has supported research in this field itself and, to an extent, the installation of operating mechanized information retrieval systems. Similarly, business and industrial organizations which have been heavily involved in research and engineering developments have pioneered in the installation of operating mechanized retrieval systems. DuPont, General Electric, IBM, the drug companies -- all have been at the forefront of the trend to mechanization.

Government, business, and industry are also concerned, however, with an equally great variety of administrative documents and standard data processing problems. More and more such areas of application involve the same considerations as the generalized and technical information retrieval problems. Inventory control, management information, correspondence files, personnel records, financial management data, all exhibit, although perhaps in a simplified form, the underlying characteristic of the information retrieval problems we have been discussing. Therefore, we have seen in the past few years the increasing application of the tools of information retrieval to such data processing and administrative areas.

One of these areas where the requirement for adequate information systems is almost self-evident is that of the law. In fact, the impact of the concepts of mechanized information retrieval on the legal profession itself is perhaps of far reaching importance. The character of American law, with its emphasis on precedence has made information retrieval a fundamental part of American legal practice for years. The implications which mechanization must have on this traditional aspect of the lawyer's job have been well recognized by the American Bar Association through its data retrieval committee. Several projects are now under way to apply data processing and information retrieval equipment to legal publishing and the consolidation of statutes in particular areas and to several other areas of activity in the law.

CONCLUSION

All of this can be summarized in this way. Mechanized information retrieval is a subject of both theoretical and practical importance. Its impact is being felt through changes in the curricula of our universities, through the bringing together of diverse intellectual disciplines on a common problem, through the knowledge gained about the structure of language, through the pressure for ever increasing capabilities in equipment, through the increased understanding of the role which information plays in decision making, through the implementation of operating installations of equipment for particular problems. It has been and is now one of the most exciting and dynamic problem areas in the modern trend to automation.

APPENDIX C TO SECTION II

VISUAL MATERIAL IN SUPPORT OF EDUCATIONAL PROGRAM

The following are copies of the items from the set of visual material which was used to illustrate and supplement the instructional program. Supported with suitable descriptive material, they could similarly assist any instructional program in library schools.

FIGURE	
1	Matrex Coordinate Index System
2	Matrex Card and Handling Unit
3	Printed Coordinate Index System
4	Machine Language Creation by Key Punching (Flexowriter)
5	Machine Language Creation by Key Punching (Remington Rand Key Punch)
6	Standardized Fonts for Character Recognition
7	Printed Request Forms for LIBRARY 21 (World Gazetteer)
8	Printed Request Forms for LIBRARY 21 (Great Ideas)
9	Printed Request Forms for LIBRARY 21 (Personalized Reading List)
10	Typical Reading List Request Card
11	Associated Computer Print Out
12	Typical 8 Channel Punched Tape Code System
13	90 Column Card Code System
14	80 Column Card Code System
15	Edge Notched Card Code System
16	Punched Card Composition Card Form
17	Index Medicus Citation Author Card
18	Index Medicus Citation Subject Card
19	Index Medicus Subject Index Card
20	Punched Card Composition
21	Magnetic Recording

FIGURE

22 Magnetic Reading Heads

23 Magnetic Tape Recording

24 Magnetic Card (NCR CRAM) Handling Unit

25 Magnetic Coding (NCR CRAM) Handling Process

26 Magnetic Card (NCR CRAM) Specifications

27 Magnetic Card (Magnavox Magnacard)

28 Magnetic Card (Magnavox Magnacard) Handling Equipment

29 Magnetic Tape Strips

30 Magnetic Disk

31 Magnetic Cores

32 Indexed Microfilm (Eastman Kodak Lodestar)

33 Coded Microfilm (FMA FileSearch)

34 Coded Microfilm Equipment (FMA FileSearch)

35 Microcard

36 Coded Image Cards (Aperture Card System)

37 Coded Image Card (Filmorex)

38 Coded Image Cards (Eastman Kodak Minicard)

39 Indexed Image Card (Magnavox MEDIA)

40 Indexed Image Card Handling Unit (Magnavox MEDIA)

41 Program Storage (Burroughs Key Operated Accounting Machine)

42 Program Storage (Typical Punched Card Plug Board)

43 Computer Data and Program Storage

44 Computer Command Codes

45 Portion of LIBRARY 21 Searching Program

II-C-3

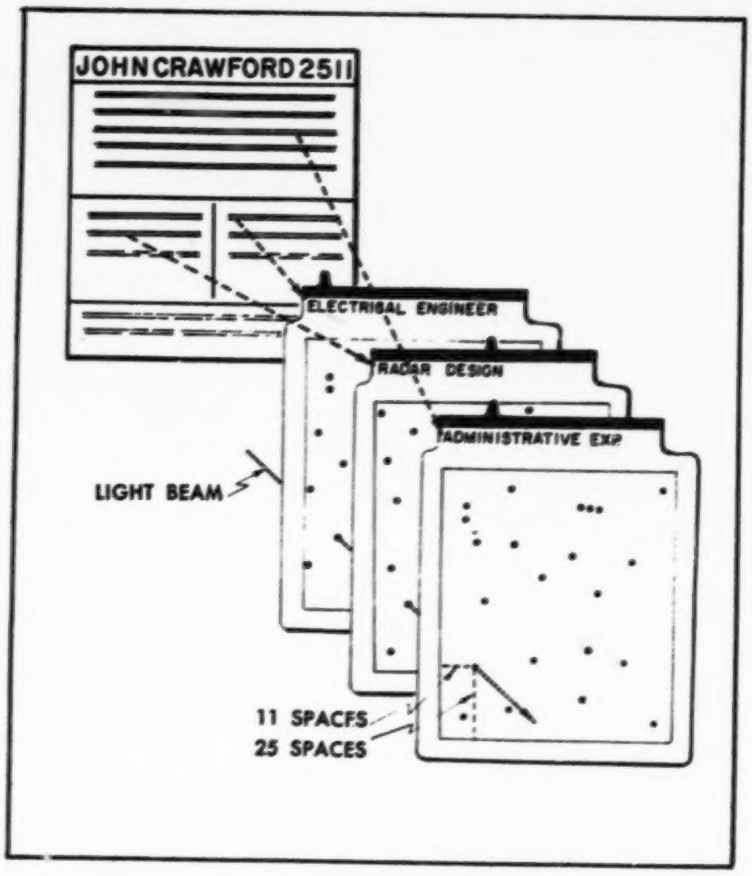
FIGURE

46 Typical Permuted Title Index

47 Typical Auto-Abstract

48 The Boolean Functions of Two Variables

Figure 1
Matrex Coordinate Index System


JOHN CRAWFORD 2511
ELECTRICAL ENGINEER
RADAR DESIGN
ADMINISTRATIVE EXP
LIGHT BEAM
11 SPACES
25 SPACES

Basic principle of Jonker systems. Each "item of information" whether a report, a document, a transaction or an employee, is identified by a serial number.

To find, for example, in a personnel file, electrical engineers with radar design experience as well as administrative experience, superimpose the cards "electrical engineer," "radar design," and "administrative experience" in a Termatrex machine. Coinciding holes, visible as lightspots, represent employees meeting these requirements. The coordinates of these lightspots could be read off visually or automatically. For example, if the y coordinate of a lightspot is 25 and the x coordinate is 11, that employee's serial number is 2511.

Figure 2
Matrex Card and Handling Unit

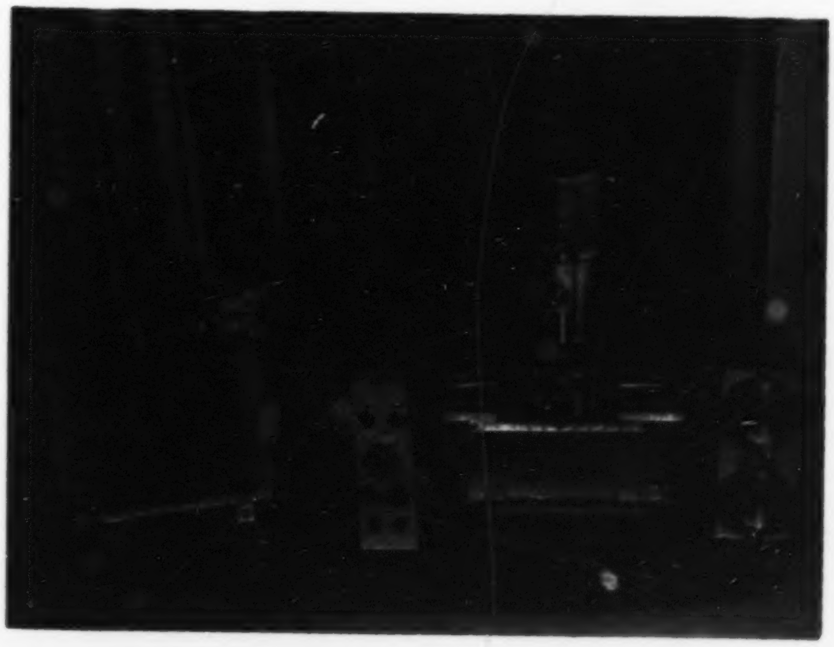


Figure 3
Printed Coordinate Index System

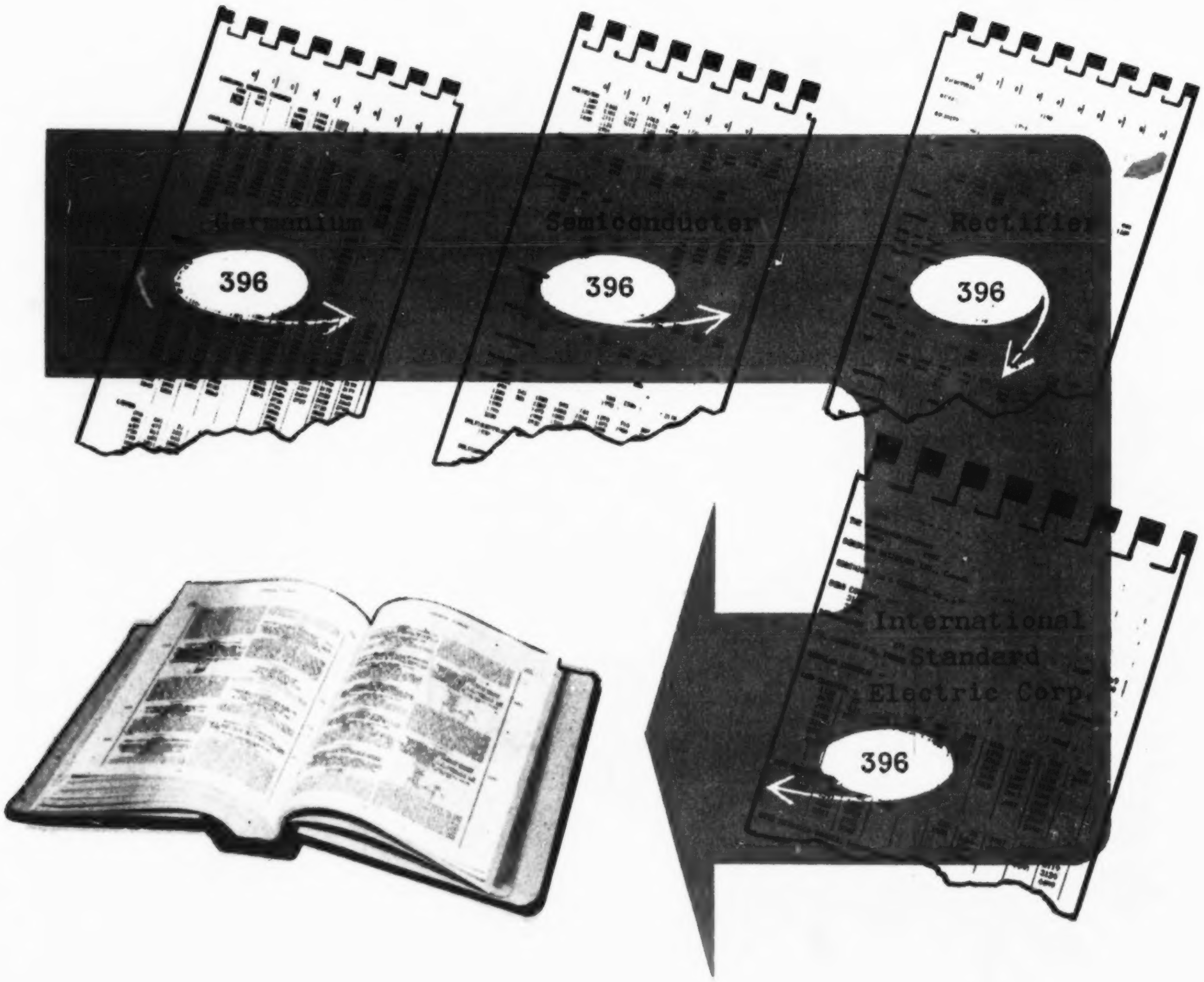

Germanium
Semiconductor
Rectifier
396
396
396
International
Standard
Electric Corp.
396

Figure 5
Machine Language Creation by Key Punching (Remington Rand Key Punch)

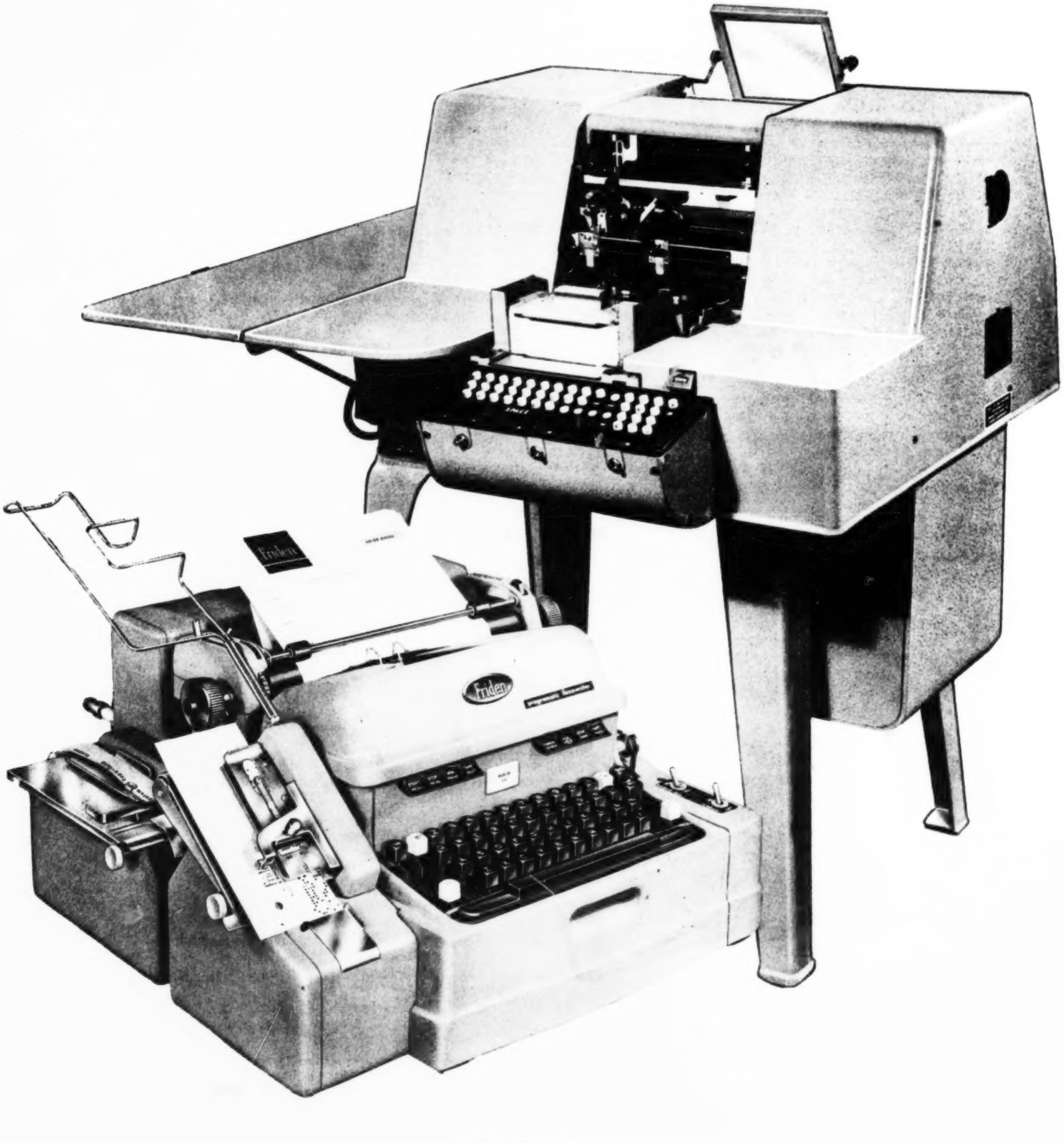


Figure 4
Machine Language Creation by Key Punching (Flexowriter)

Figure 6
Standardized Fonts for Character Recognition

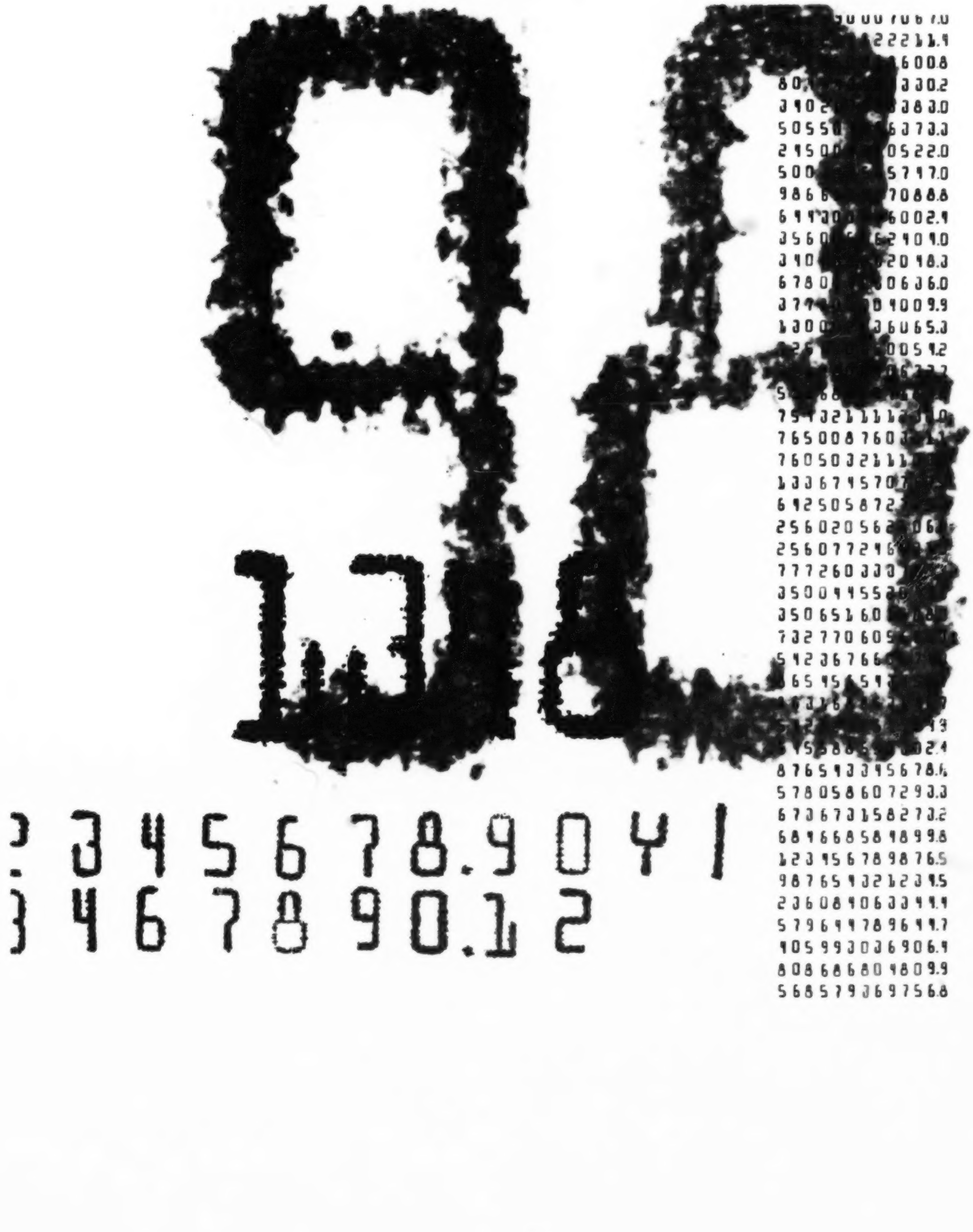
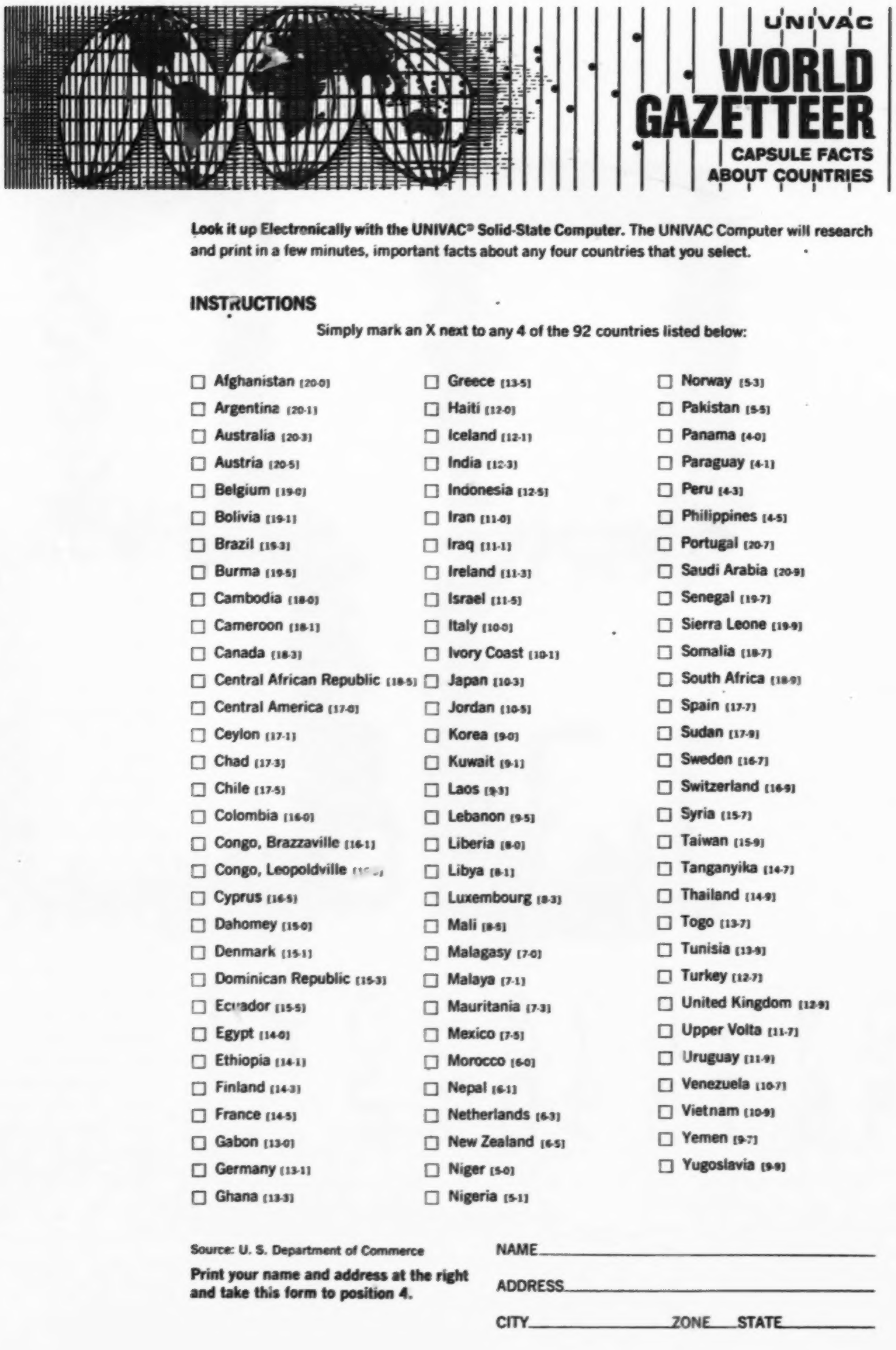

2 3 4 5 6 7 8.9 0 Y |
3 4 6 7 8 9 0.1 2

Figure 7
Printed Request Forms for Library 21 (World Gazetteer)


UNIVAC
WORLD GAZETTEER
CAPSULE FACTS ABOUT COUNTRIES

Look it up Electronically with the UNIVAC® Solid-State Computer. The UNIVAC Computer will research and print in a few minutes, important facts about any four countries that you select.

INSTRUCTIONS

Simply mark an X next to any 4 of the 92 countries listed below:

- ☐ **Afghanistan** (20-0)
- ☐ **Argentina** (20-1)
- ☐ **Australia** (20-3)
- ☐ **Austria** (20-5)
- ☐ **Belgium** (19-0)
- ☐ **Bolivia** (19-1)
- ☐ **Brazil** (19-3)
- ☐ **Burma** (19-5)
- ☐ **Cambodia** (18-0)
- ☐ **Cameroon** (18-1)
- ☐ **Canada** (18-3)
- ☐ **Central African Republic** (18-5)
- ☐ **Central America** (17-0)
- ☐ **Ceylon** (17-1)
- ☐ **Chad** (17-3)
- ☐ **Chile** (17-5)
- ☐ **Colombia** (16-0)
- ☐ **Congo, Brazzaville** (16-1)
- ☐ **Congo, Leopoldville** ([illegible])
- ☐ **Cyprus** (16-5)
- ☐ **Dahomey** (15-0)
- ☐ **Denmark** (15-1)
- ☐ **Dominican Republic** (15-3)
- ☐ **Ecuador** (15-5)
- ☐ **Egypt** (14-0)
- ☐ **Ethiopia** (14-1)
- ☐ **Finland** (14-3)
- ☐ **France** (14-5)
- ☐ **Gabon** (13-0)
- ☐ **Germany** (13-1)
- ☐ **Ghana** (13-3)
- ☐ **Greece** (13-5)
- ☐ **Haiti** (12-0)
- ☐ **Iceland** (12-1)
- ☐ **India** (12-3)
- ☐ **Indonesia** (12-5)
- ☐ **Iran** (11-0)
- ☐ **Iraq** (11-1)
- ☐ **Ireland** (11-3)
- ☐ **Israel** (11-5)
- ☐ **Italy** (10-0)
- ☐ **Ivory Coast** (10-1)
- ☐ **Japan** (10-3)
- ☐ **Jordan** (10-5)
- ☐ **Korea** (9-0)
- ☐ **Kuwait** (9-1)
- ☐ **Laos** (9-3)
- ☐ **Lebanon** (9-5)
- ☐ **Liberia** (8-0)
- ☐ **Libya** (8-1)
- ☐ **Luxembourg** (8-3)
- ☐ **Mali** (8-5)
- ☐ **Malagasy** (7-0)
- ☐ **Malaya** (7-1)
- ☐ **Mauritania** (7-3)
- ☐ **Mexico** (7-5)
- ☐ **Morocco** (6-0)
- ☐ **Nepal** (6-1)
- ☐ **Netherlands** (6-3)
- ☐ **New Zealand** (6-5)
- ☐ **Niger** (5-0)
- ☐ **Nigeria** (5-1)
- ☐ **Norway** (5-3)
- ☐ **Pakistan** (5-5)
- ☐ **Panama** (4-0)
- ☐ **Paraguay** (4-1)
- ☐ **Peru** (4-3)
- ☐ **Philippines** (4-5)
- ☐ **Portugal** (20-7)
- ☐ **Saudi Arabia** (20-9)
- ☐ **Senegal** (19-7)
- ☐ **Sierra Leone** (19-9)
- ☐ **Somalia** (18-7)
- ☐ **South Africa** (18-9)
- ☐ **Spain** (17-7)
- ☐ **Sudan** (17-9)
- ☐ **Sweden** (16-7)
- ☐ **Switzerland** (16-9)
- ☐ **Syria** (15-7)
- ☐ **Taiwan** (15-9)
- ☐ **Tanganyika** (14-7)
- ☐ **Thailand** (14-9)
- ☐ **Togo** (13-7)
- ☐ **Tunisia** (13-9)
- ☐ **Turkey** (12-7)
- ☐ **United Kingdom** (12-9)
- ☐ **Upper Volta** (11-7)
- ☐ **Uruguay** (11-9)
- ☐ **Venezuela** (10-7)
- ☐ **Vietnam** (10-9)
- ☐ **Yemen** (9-7)
- ☐ **Yugoslavia** (9-9)

Source: U. S. Department of Commerce

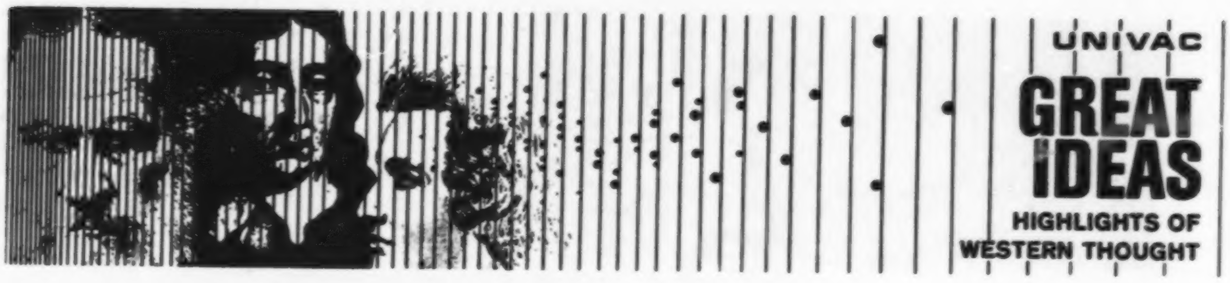
Print your name and address at the right and take this form to position 4.

NAME______________________________

ADDRESS____________________________

CITY______________ZONE____STATE________

Figure 8
Printed Request Forms for Library 21 (Great Ideas)



Look it up Electronically with the UNIVAC® Solid-State Computer. The UNIVAC Computer will research the works of 74 authors below and print 4 authors' quotations on a subject you select.

INSTRUCTIONS

Mark an X next to one of the subjects listed at the right:

SUBJECTS

☐ MAN—The differences and relations between men and women [3-0]
☐ HAPPINESS—The nature and attainability of happiness [3-1]
☐ PUNISHMENT—The purpose of punishment [3-3]
☐ FAMILY—The relations between parents and children [3-5]
☐ LIBERTY—The freedom of the individual in society [2-0]
☐ GOD—The existence of God [2-1]
☐ LOVE—The nature of friendship [2-3]
☐ EDUCATION—In the life of the individual and the state [2-5]

Then mark an X next to any 4 of the 74 authors listed below:

AUTHORS

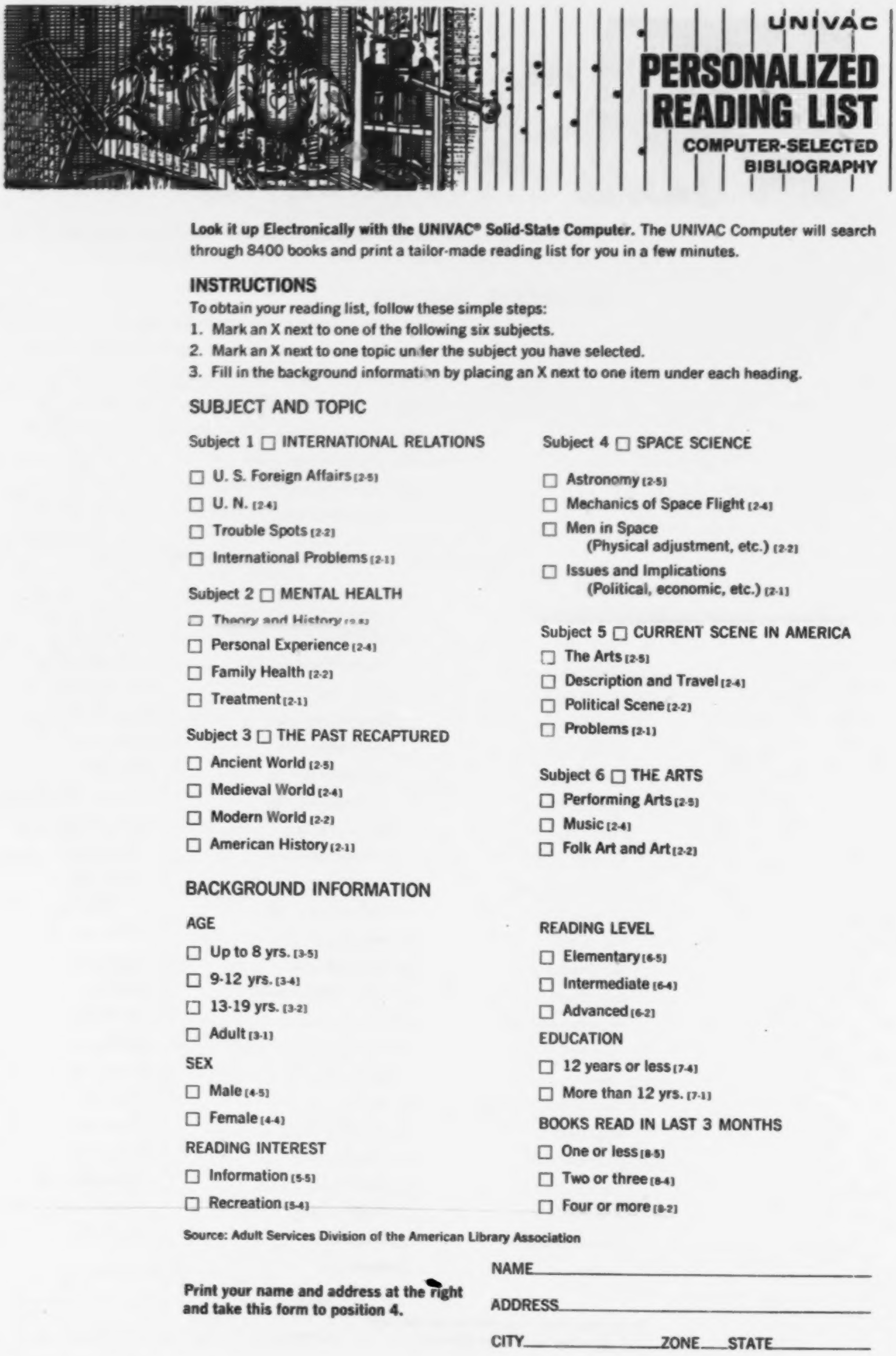
☐ Bible [20-0]
☐ Homer [20-1]
☐ Aeschylus [20-3]
☐ Sophocles [20-5]
☐ Euripides [19-0]
☐ Aristophanes [19-1]
☐ Herodotus [19-3]
☐ Thucydides [19-5]
☐ Plato [18-0]
☐ Aristotle [18-1]
☐ Hippocrates [18-3]
☐ Galen [18-5]
☐ Euclid [17-0]
☐ Archimedes [17-1]
☐ Appolonius [17-3]
☐ Nicomachus [17-5]
☐ Lucretius [16-0]
☐ Epictetus [16-1]
☐ Marcus Aurelius [16-3]
☐ Virgil [16-5]
☐ Plutarch [15-0]
☐ Tacitus [15-1]
☐ Ptolemy [15-3]
☐ Copernicus [15-5]
☐ Kepler [14-0]
☐ Plotinus [14-1]
☐ Augustine [14-3]
☐ Thomas Aquinas [14-5]
☐ Dante [13-0]
☐ Chaucer [13-1]
☐ Machiavelli [13-3]
☐ Hobbes [13-5]
☐ Rabelais [12-0]
☐ Montaigne [12-1]
☐ Shakespeare [12-3]
☐ Gilbert [12-5]
☐ Galileo [11-0]
☐ Harvey [11-1]
☐ Cervantes [11-3]
☐ Francis Bacon [11-5]
☐ Descartes [10-0]
☐ Spinoza [10-1]
☐ Milton [10-3]
☐ Pascal [10-5]
☐ Newton [9-0]
☐ Huygens [9-1]
☐ Locke [9-3]
☐ Berkeley [9-5]
☐ Hume [8-0]
☐ Swift [8-1]
☐ Sterne [8-3]
☐ Fielding [8-5]
☐ Montesquieu [7-0]
☐ Rousseau [7-1]
☐ Adam Smith [7-3]
☐ Gibbon [7-5]
☐ Kant [6-0]
☐ American State Papers [6-1]
☐ The Federalist [6-3]
☐ J. S. Mill [6-5]
☐ Boswell [5-0]
☐ Lavoisier [5-1]
☐ Fourier [5-3]
☐ Faraday [5-5]
☐ Hegel [4-0]
☐ Goethe [4-1]
☐ Melville [4-3]
☐ Darwin [4-5]
☐ Marx [20-7]
☐ Engels [20-9]
☐ Tolstoy [19-7]
☐ Dostoevsky [19-9]
☐ William James [18-7]
☐ Freud [18-9]

Print your name and address at the right and take this form to position 4.

NAME______________________________
ADDRESS___________________________
CITY_____________ZONE____STATE_______

Source: Great Books of the Western World, published by the Encyclopaedia Britannica, Inc.

Figure 9
Printed Request Forms (Personalized Reading List)



UNIVAC

PERSONALIZED READING LIST

COMPUTER-SELECTED BIBLIOGRAPHY

Look it up Electronically with the UNIVAC® Solid-State Computer. The UNIVAC Computer will search through 8400 books and print a tailor-made reading list for you in a few minutes.

INSTRUCTIONS

To obtain your reading list, follow these simple steps:

1. Mark an X next to one of the following six subjects.
2. Mark an X next to one topic under the subject you have selected.
3. Fill in the background information by placing an X next to one item under each heading.

SUBJECT AND TOPIC

Subject 1 ☐ INTERNATIONAL RELATIONS

☐ U. S. Foreign Affairs [2-5]
☐ U. N. [2-4]
☐ Trouble Spots [2-2]
☐ International Problems [2-1]

Subject 2 ☐ MENTAL HEALTH

☐ Theory and History [2-5]
☐ Personal Experience [2-4]
☐ Family Health [2-2]
☐ Treatment [2-1]

Subject 3 ☐ THE PAST RECAPTURED

☐ Ancient World [2-5]
☐ Medieval World [2-4]
☐ Modern World [2-2]
☐ American History [2-1]

Subject 4 ☐ SPACE SCIENCE

☐ Astronomy [2-5]
☐ Mechanics of Space Flight [2-4]
☐ Men in Space
(Physical adjustment, etc.) [2-2]
☐ Issues and Implications
(Political, economic, etc.) [2-1]

Subject 5 ☐ CURRENT SCENE IN AMERICA

☐ The Arts [2-5]
☐ Description and Travel [2-4]
☐ Political Scene [2-2]
☐ Problems [2-1]

Subject 6 ☐ THE ARTS

☐ Performing Arts [2-5]
☐ Music [2-4]
☐ Folk Art and Art [2-2]

BACKGROUND INFORMATION

AGE

☐ Up to 8 yrs. [3-5]
☐ 9-12 yrs. [3-4]
☐ 13-19 yrs. [3-2]
☐ Adult [3-1]

SEX

☐ Male [4-5]
☐ Female [4-4]

READING INTEREST

☐ Information [5-5]
☐ Recreation [5-4]

READING LEVEL

☐ Elementary [6-5]
☐ Intermediate [6-4]
☐ Advanced [6-2]

EDUCATION

☐ 12 years or less [7-4]
☐ More than 12 yrs. [7-1]

BOOKS READ IN LAST 3 MONTHS

☐ One or less [8-5]
☐ Two or three [8-4]
☐ Four or more [8-2]

Source: Adult Services Division of the American Library Association

Print your name and address at the right and take this form to position 4.

NAME____________________
ADDRESS____________________
CITY__________ZONE____STATE________

Figure 10
Typical Reading List Request Card

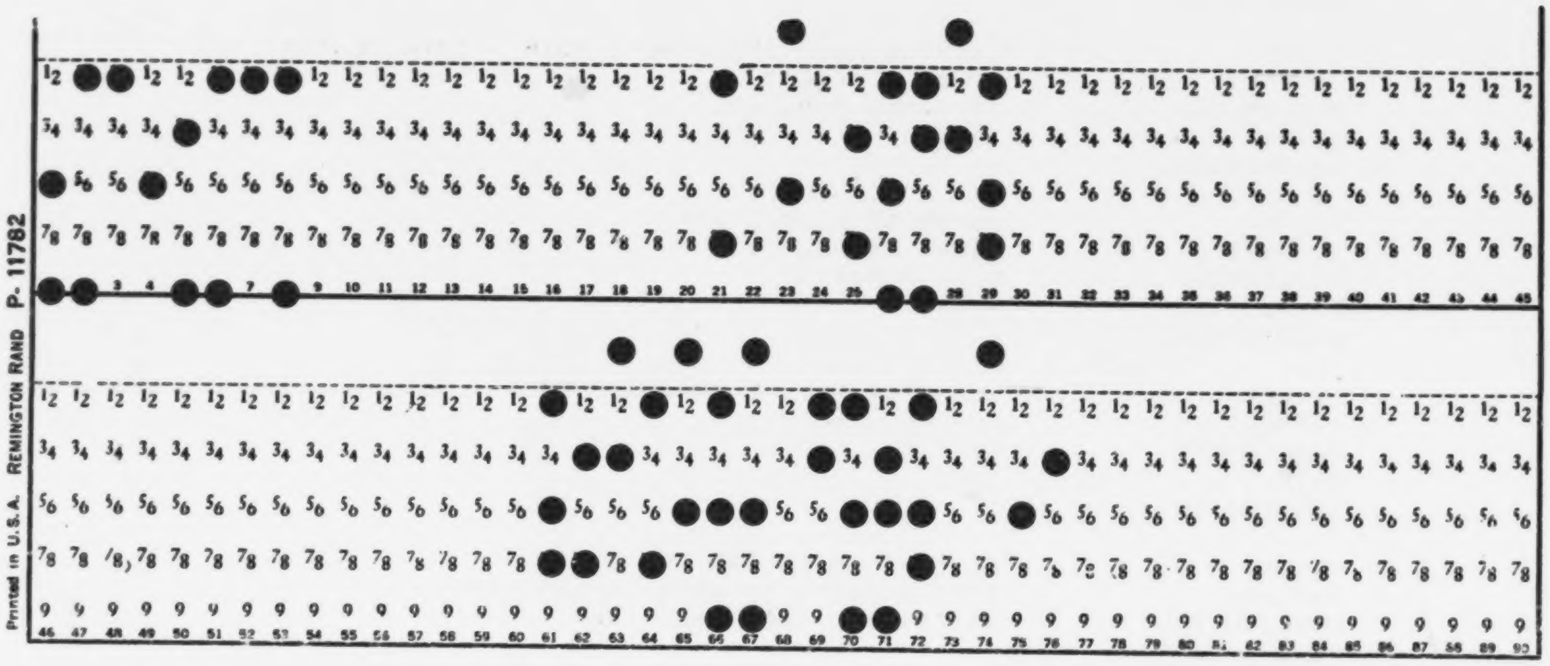
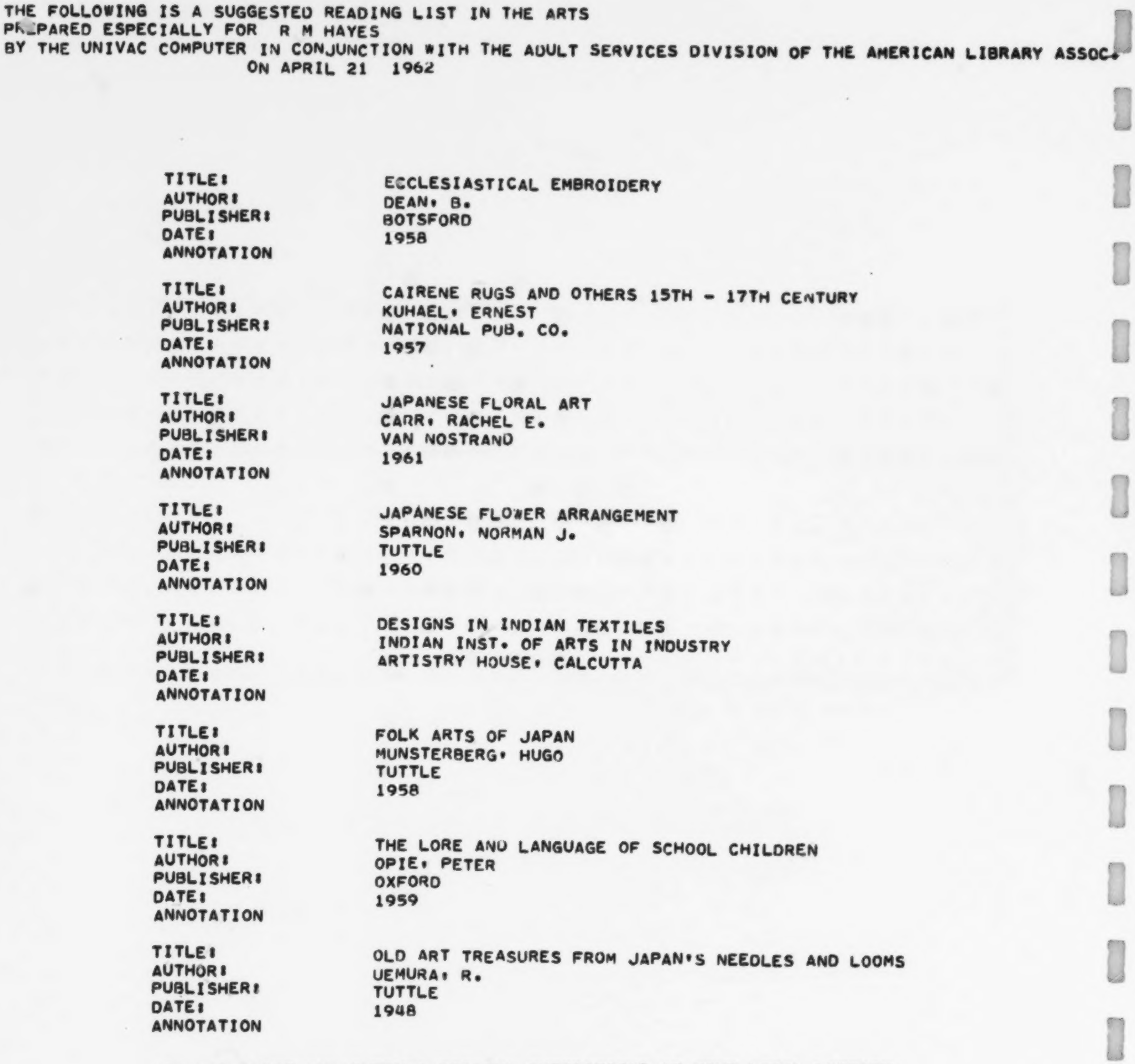

P- 11782
REMINGTON RAND
Printed in U.S.A.

Figure 11
Associated Computer Print Out



```
THE FOLLOWING IS A SUGGESTED READING LIST IN THE ARTS
PREPARED ESPECIALLY FOR  R M HAYES
BY THE UNIVAC COMPUTER IN CONJUNCTION WITH THE ADULT SERVICES DIVISION OF THE AMERICAN LIBRARY ASSOC.
                    ON APRIL 21  1962



             TITLE:               ECCLESIASTICAL EMBROIDERY
             AUTHOR:              DEAN, B.
             PUBLISHER:           BOTSFORD
             DATE:                1958
             ANNOTATION

             TITLE:               CAIRENE RUGS AND OTHERS 15TH - 17TH CENTURY
             AUTHOR:              KUHAEL, ERNEST
             PUBLISHER:           NATIONAL PUB. CO.
             DATE:                1957
             ANNOTATION

             TITLE:               JAPANESE FLORAL ART
             AUTHOR:              CARR, RACHEL E.
             PUBLISHER:           VAN NOSTRAND
             DATE:                1961
             ANNOTATION

             TITLE:               JAPANESE FLOWER ARRANGEMENT
             AUTHOR:              SPARNON, NORMAN J.
             PUBLISHER:           TUTTLE
             DATE:                1960
             ANNOTATION

             TITLE:               DESIGNS IN INDIAN TEXTILES
             AUTHOR:              INDIAN INST. OF ARTS IN INDUSTRY
             PUBLISHER:           ARTISTRY HOUSE, CALCUTTA
             DATE:
             ANNOTATION

             TITLE:               FOLK ARTS OF JAPAN
             AUTHOR:              MUNSTERBERG, HUGO
             PUBLISHER:           TUTTLE
             DATE:                1958
             ANNOTATION

             TITLE:               THE LORE AND LANGUAGE OF SCHOOL CHILDREN
             AUTHOR:              OPIE, PETER
             PUBLISHER:           OXFORD
             DATE:                1959
             ANNOTATION

             TITLE:               OLD ART TREASURES FROM JAPAN'S NEEDLES AND LOOMS
             AUTHOR:              UEMURA, R.
             PUBLISHER:           TUTTLE
             DATE:                1948
             ANNOTATION

             ASK FOR THESE AND FURTHER READING SUGGESTIONS AT YOUR LOCAL LIBRARY.
```

Figure 12
Typical 8 Channel Punched Tape Code System

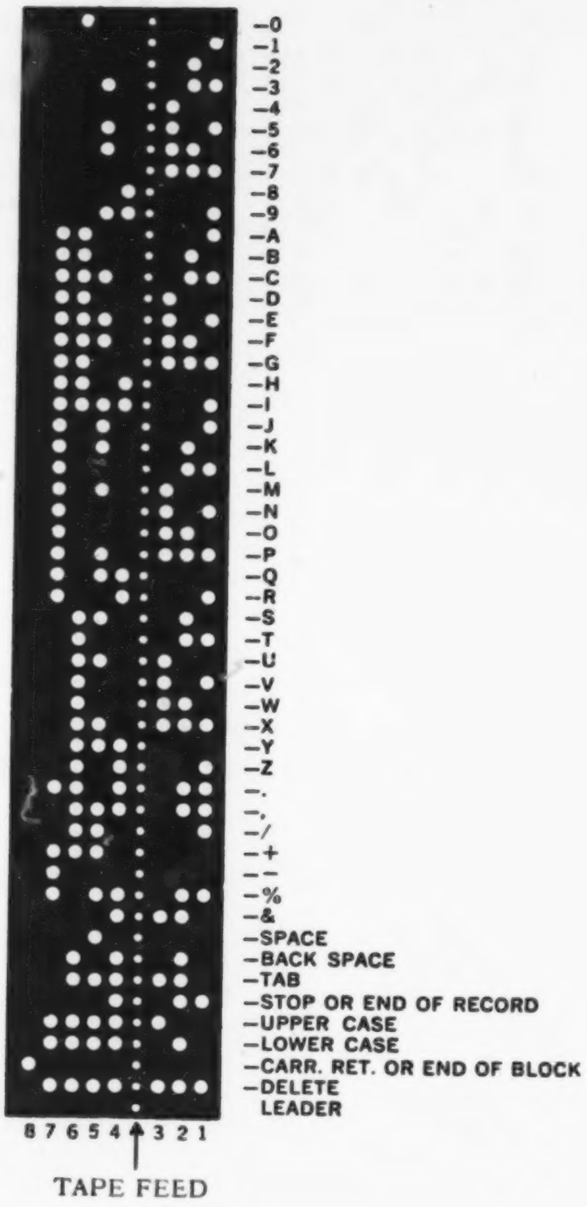

–0
–1
–2
–3
–4
–5
–6
–7
–8
–9
–A
–B
–C
–D
–E
–F
–G
–H
–I
–J
–K
–L
–M
–N
–O
–P
–Q
–R
–S
–T
–U
–V
–W
–X
–Y
–Z
–.
–,
–/
–+
–−
–%
–&
–SPACE
–BACK SPACE
–TAB
–STOP OR END OF RECORD
–UPPER CASE
–LOWER CASE
–CARR. RET. OR END OF BLOCK
–DELETE
LEADER
8 7 6 5 4 3 2 1
TAPE FEED

Figure 13
90 Column Card Code System

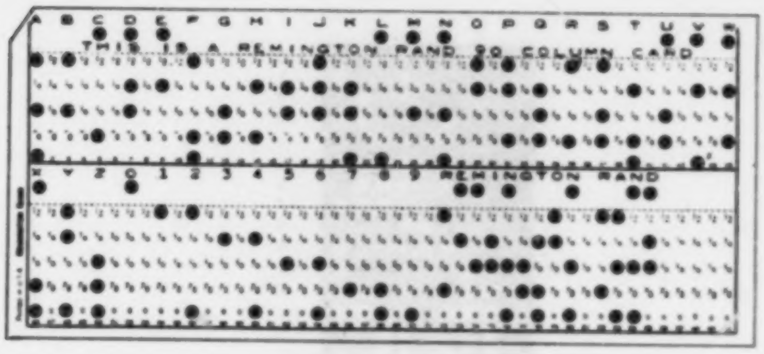

A B C D E F G H I J K L M N O P Q R S T U V W
THIS IS A REMINGTON RAND 90 COLUMN CARD
X Y Z 0 1 2 3 4 5 6 7 8 9
REMINGTON RAND

Figure 14
80 Column Card Code System

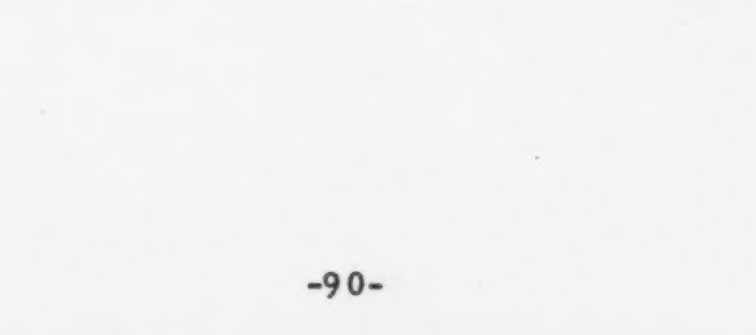

ABCDEFGHI
JKLMNOPQR
STUVWXYZ
123456789
REMINGTON RAND
THIS IS A SAMPLE OF AN 80 COLUMN CARD

Figure 15
Edge Notched Card Code System

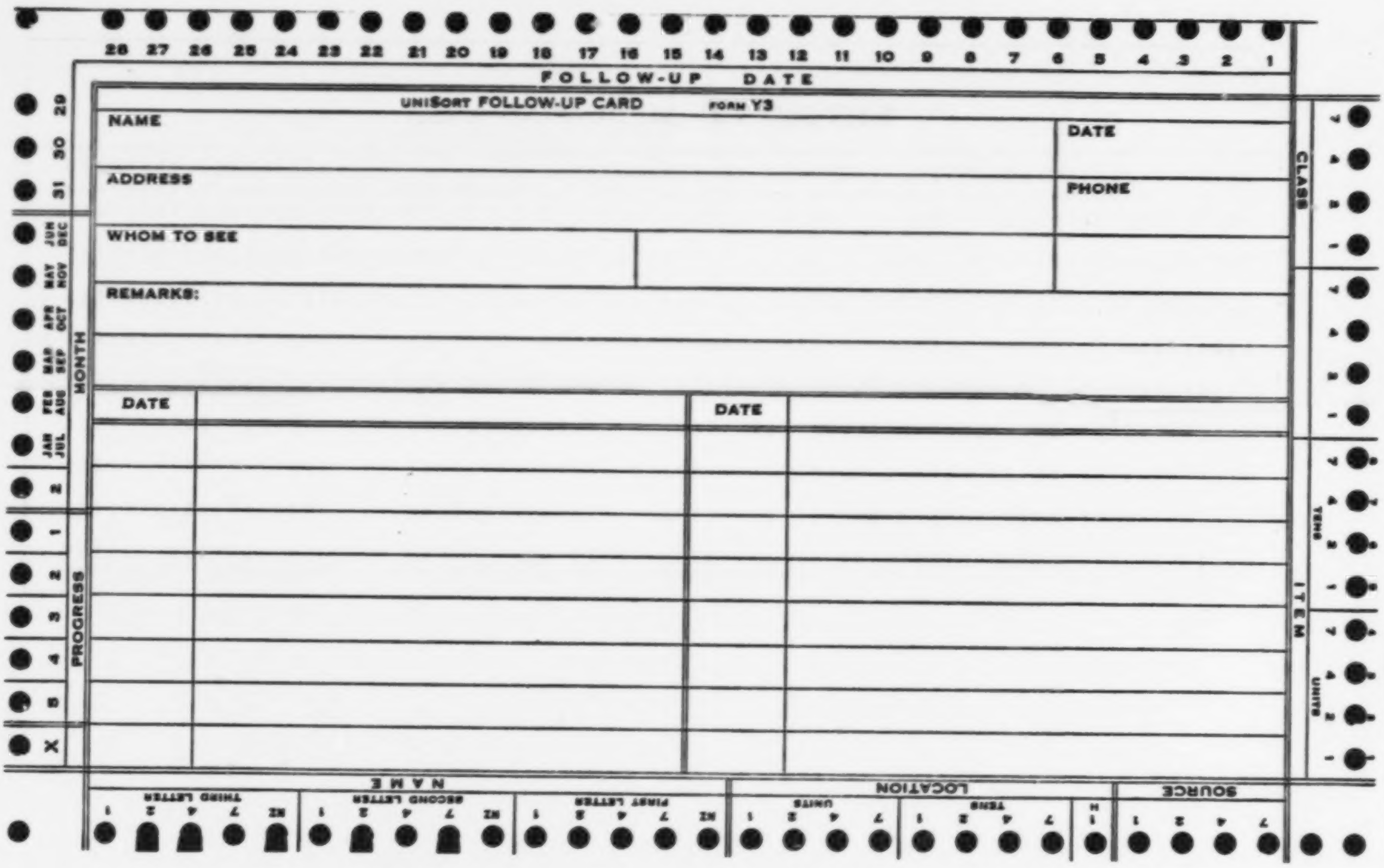

28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
FOLLOW-UP DATE
UNISORT FOLLOW-UP CARD
FORM Y3
NAME
DATE
ADDRESS
PHONE
WHOM TO SEE
REMARKS:
DATE
DATE
29
30
31
JUN DEC
MAY NOV
APR OCT
MAR SEP
FEB AUG
JAN JUL
MONTH
2
1
2
3
4
5
PROGRESS
X
CLASS
ITEM
TENS
UNITS
NAME
THIRD LETTER
SECOND LETTER
FIRST LETTER
LOCATION
UNITS
TENS
SOURCE

Figure 16
Punched Card Composition Card Form

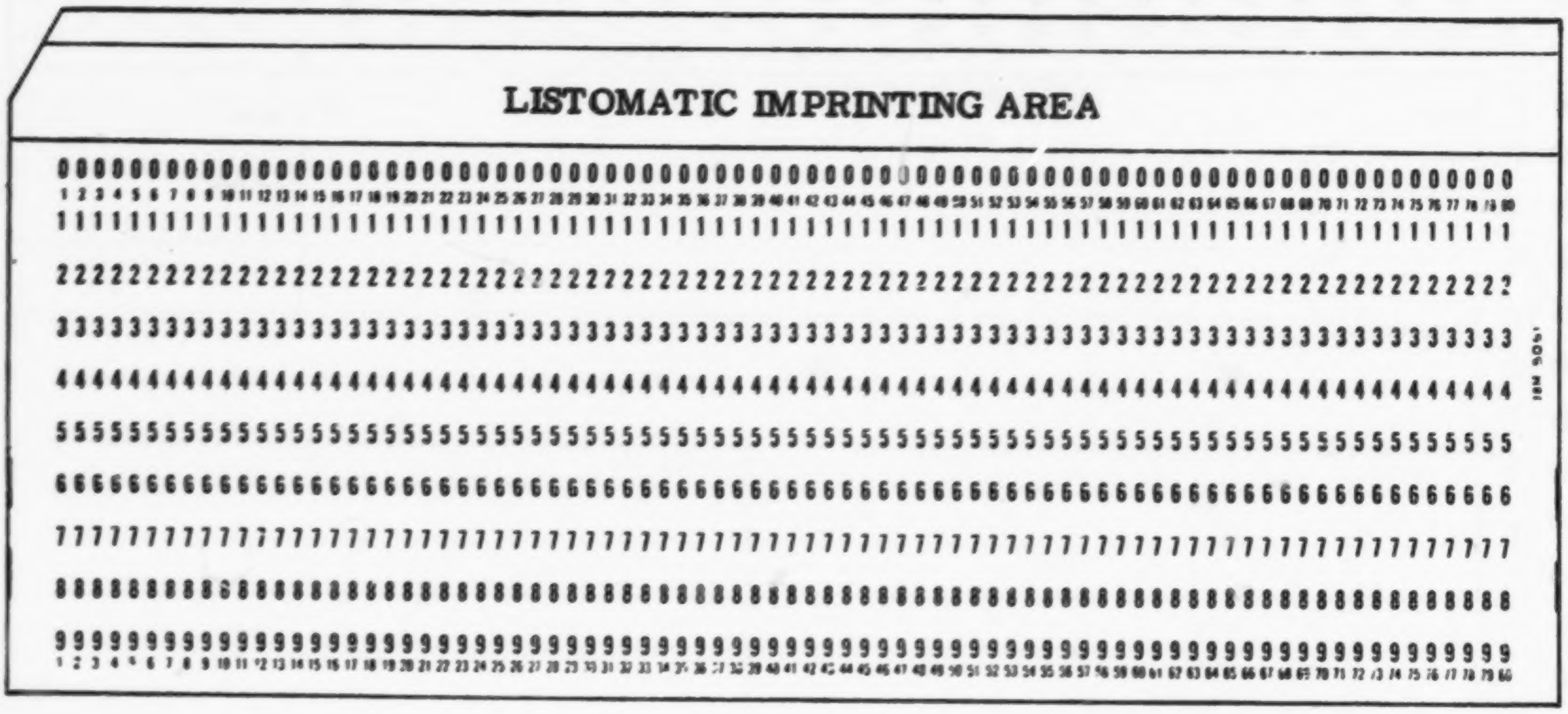

LISTOMATIC IMPRINTING AREA
IBM 5081

Figure 17
Index Medicus Citation Author Card

Figure 18
Index Medicus Citation Subject Card

Figure 19
Index Medicus Subject Index Cards

Figure 20
Punched Card Composition

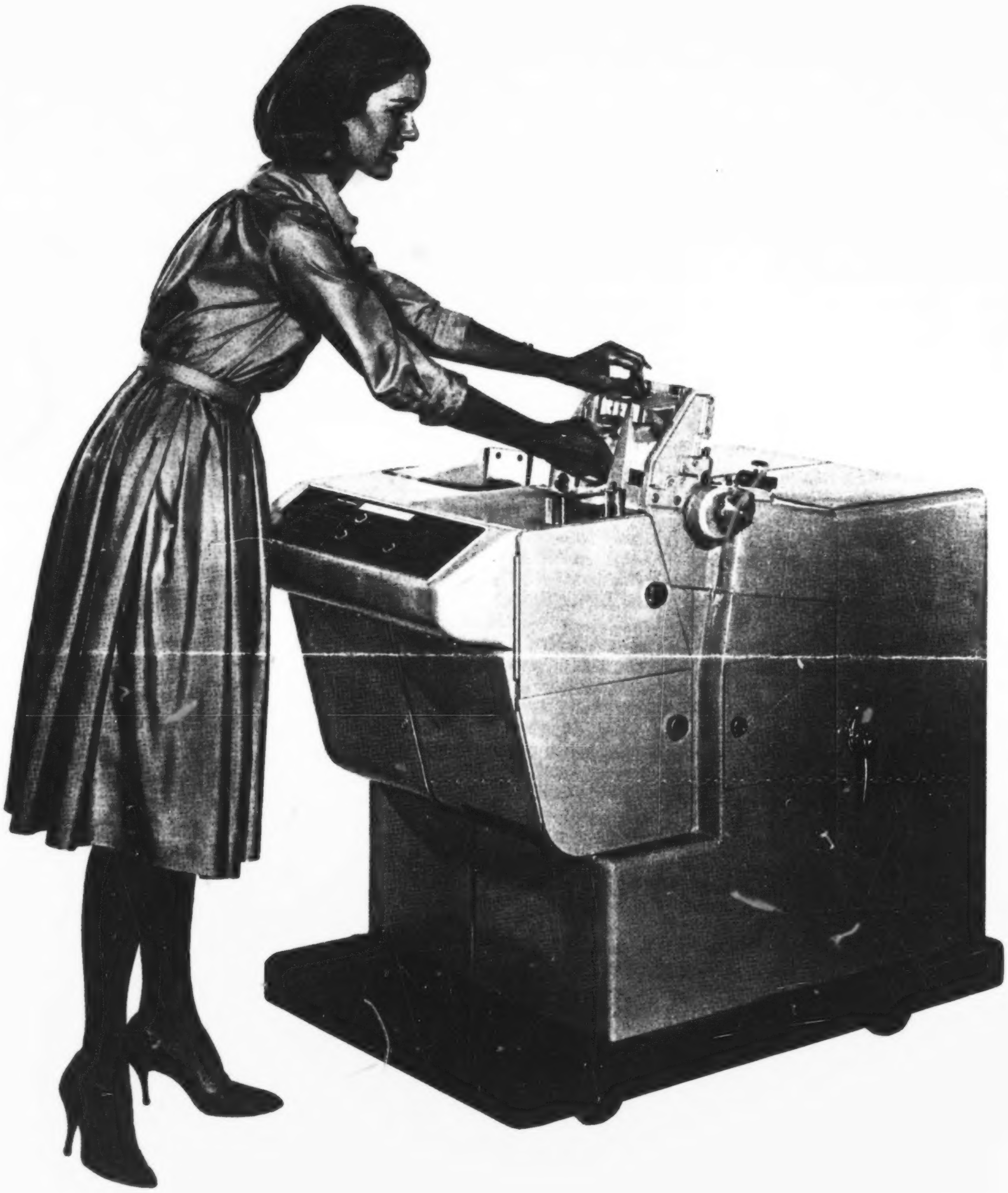


Figure 21
Magnetic Recording

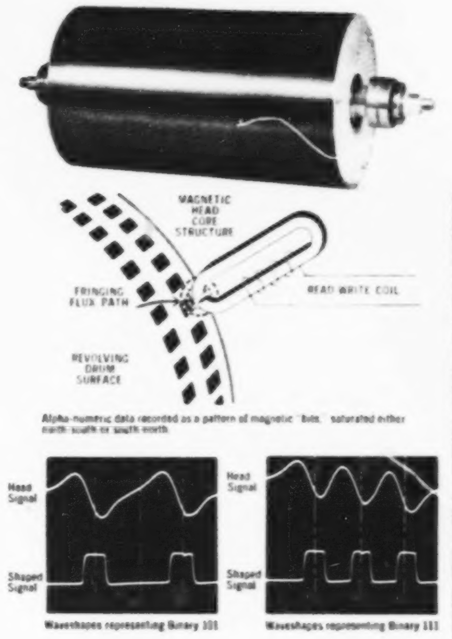
Magnetic Drum Storage – *What it is*

A magnetic drum consists of a rotating cast aluminum cylinder, and a case for positioning a set of electromagnetic heads. The heads are arranged in helical rows, .002" from the surface of the revolving drum. Storage of information is accomplished by the magnetization of small areas of iron oxide coated on the rotor surface by electric currents flowing in the head coil. The polarity of the pulse determines whether a binary "1" or "0" is stored. The location of each magnetized spot, or "bit" on the drum is defined in terms of its axial and angular coordinates.

Recovery of stored information is achieved by detection of voltages induced in the head coil by passage of the magnetized areas past the magnetic heads. The head signal is reshaped and passed to proper reading circuits. Location, or "addressing" of a bit is accomplished by means of a timing track on the drum and the selection of the proper head.

Combinations of magnetized areas can be used to store the information from coded alphabetic or numeric representations on punched cards (80 or 90 column), punched paper tape, magnetic tape, typewriters and other keyboard devices, or other information sources.

Binary digits may be represented in two manners, designated return-to-zero (RZ) and non-return-to-zero (NRZ). With the RZ system (the system used by UNIVAC) magnetization goes from zero to positive saturation and back to zero again for each "1" stored.


MAGNETIC HEAD CORE STRUCTURE
FRINGING FLUX PATH
READ WRITE COIL
REVOLVING DRUM SURFACE
Head Signal
Shaped Signal
Head Signal
Shaped Signal

Alpha-numeric data recorded as a pattern of magnetic "bits," saturated either north-south or south-north

Waveshapes representing Binary 101

Waveshapes representing Binary 111

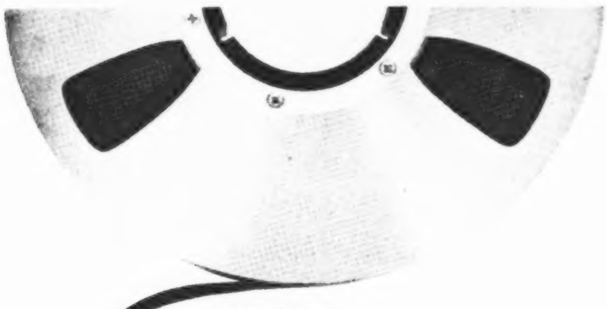
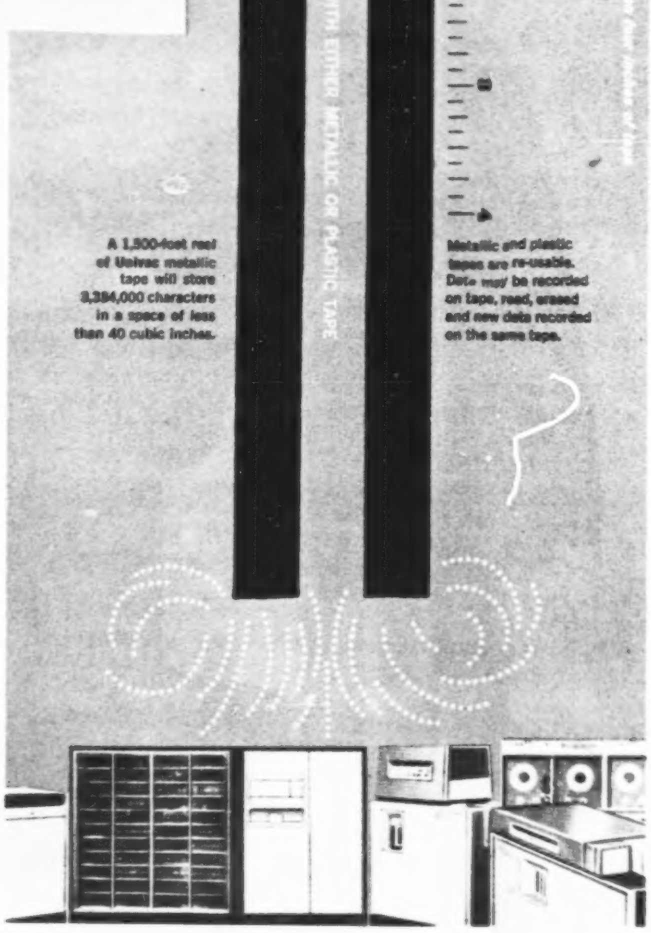


Figure 22
Magnetic Reading Heads


THE UNIVAC MAGNETIC TAPE UNITS WILL OPERATE WITH EITHER METALLIC OR PLASTIC TAPE

A 1,500-foot reel of Univac metallic tape will store 3,384,000 characters in a space of less than 40 cubic inches.

Metallic and plastic tapes are re-usable. Data may be recorded on tape, read, erased and new data recorded on the same tape.

Figure 23
Magnetic Tape Recording

Figure 25
Magnetic Coding (NCR CRAM) Handling Process

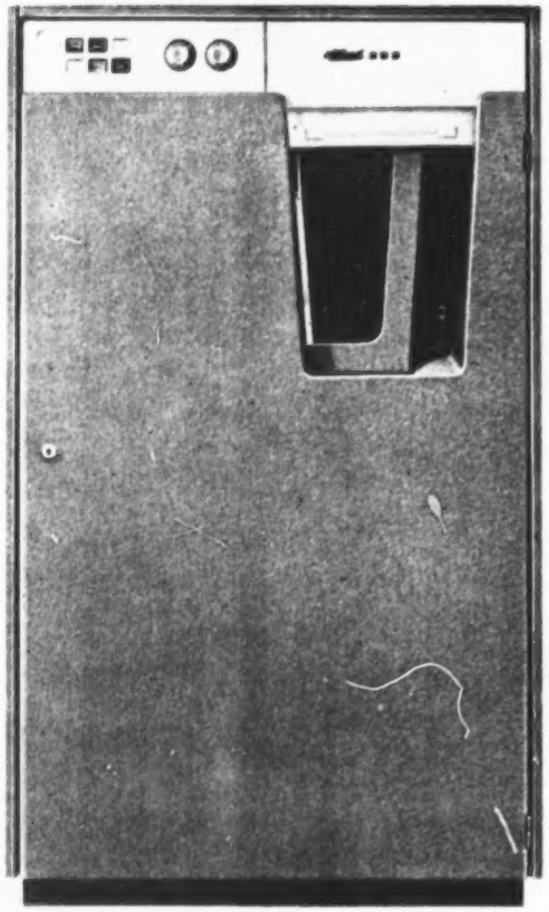
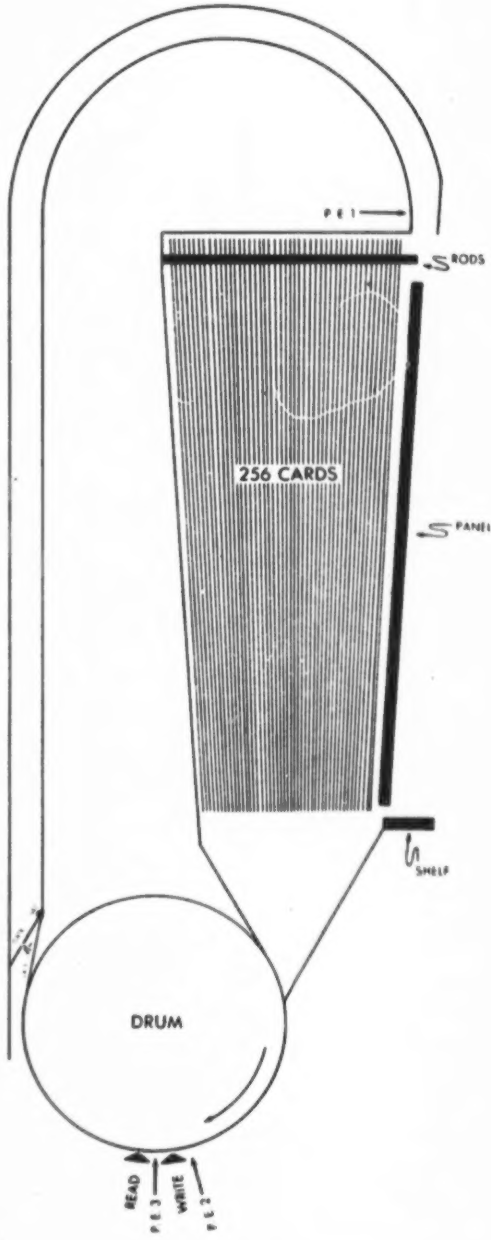
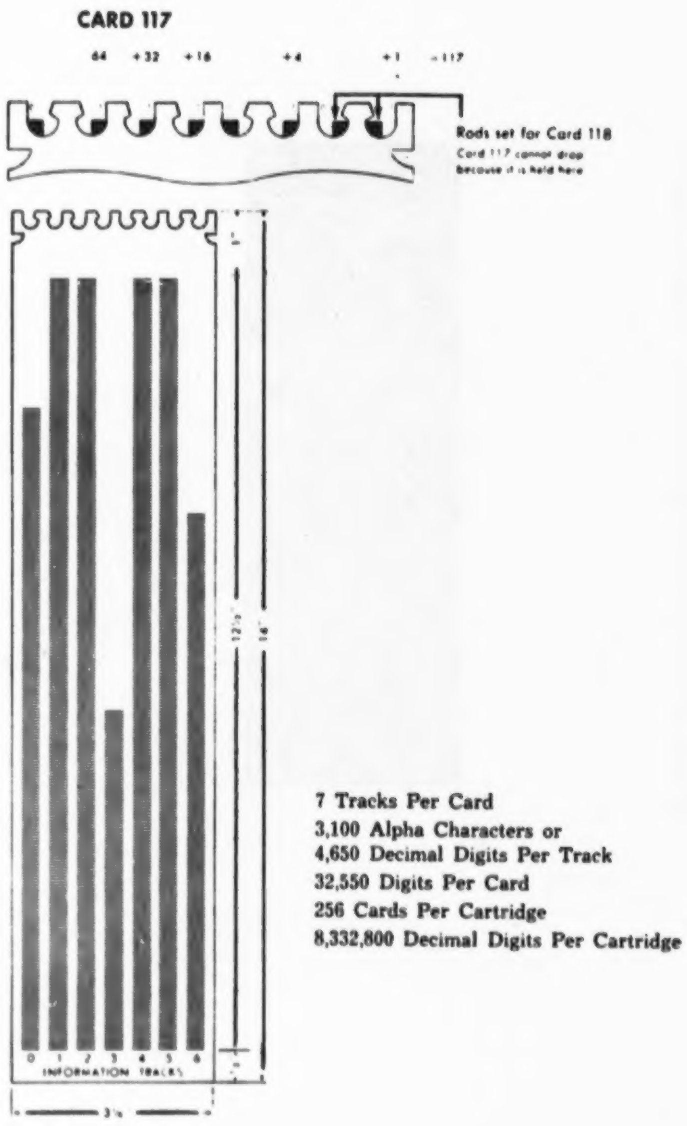


Figure 24
Magnetic Card (NCR CRAM) Handling Unit


P E 1
RODS
256 CARDS
PANEL
SHELF
DRUM
READ
P E 3
WRITE
P E 2

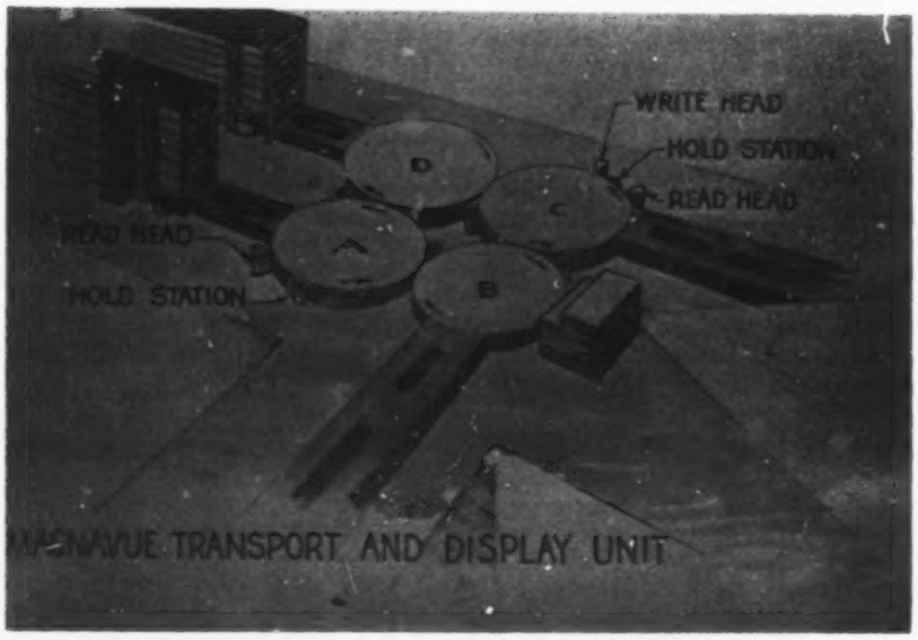

CARD 117
64
+32
+16
+4
+1
=117
Rods set for Card 118
Card 117 cannot drop because it is held here
0 1 2 3 4 5 6
INFORMATION TRACKS

7 Tracks Per Card
3,100 Alpha Characters or
4,650 Decimal Digits Per Track
32,550 Digits Per Card
256 Cards Per Cartridge
8,332,800 Decimal Digits Per Cartridge

Figure 26
Magnetic Card (NCR CRAM) Specifications

Figure 27
Magnetic Card (Magnavox Magnacard)

Figure 28
Magnetic Card (Magnavox Magnacard) Handling Equipment


WRITE HEAD
HOLD STATION
READ HEAD
D
C
READ HEAD
A
HOLD STATION
B
MAGNAVUE TRANSPORT AND DISPLAY UNIT

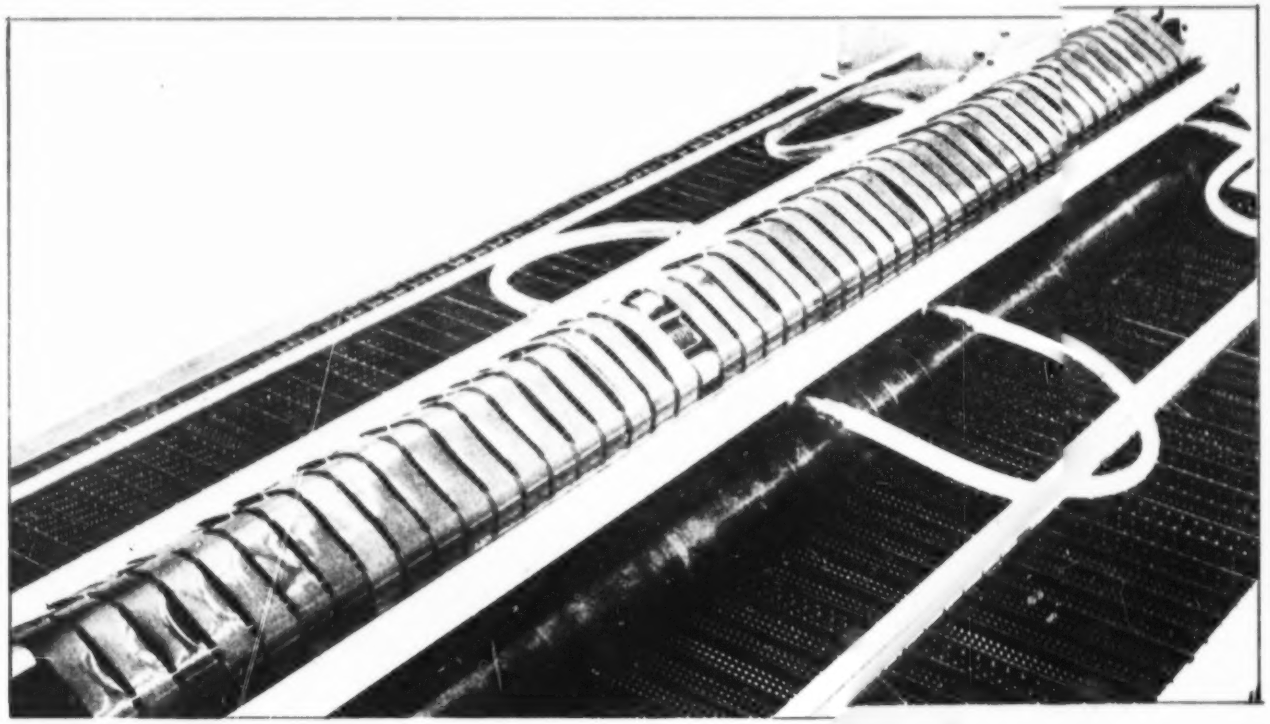


Figure 29
Magnetic Tape Strips

CHARACTERISTICS OF THE DATAFILE

PHYSICAL DESCRIPTION

The DataFile contains fifty separate 250 foot lengths of magnetic tape within the cabinet. Each hangs free between static-free metal partitions. A pair of magnetic reading and writing heads capable of selecting any particular tape moves beneath the tapes at a high rate of speed. Two lanes of information are recorded on each tape in addressed blocks of twenty words each. (See Magnetic Tape System Handbook.) On each of the fifty tapes, 1000 blocks, numbered 000 through 999, are recorded in each lane. Thus, there are 2000 blocks on each tape and a total of 100,000 blocks, or 2,000,000 words, per DataFile. Logically, each lane is addressable. There are a total of 100 lanes on which to read

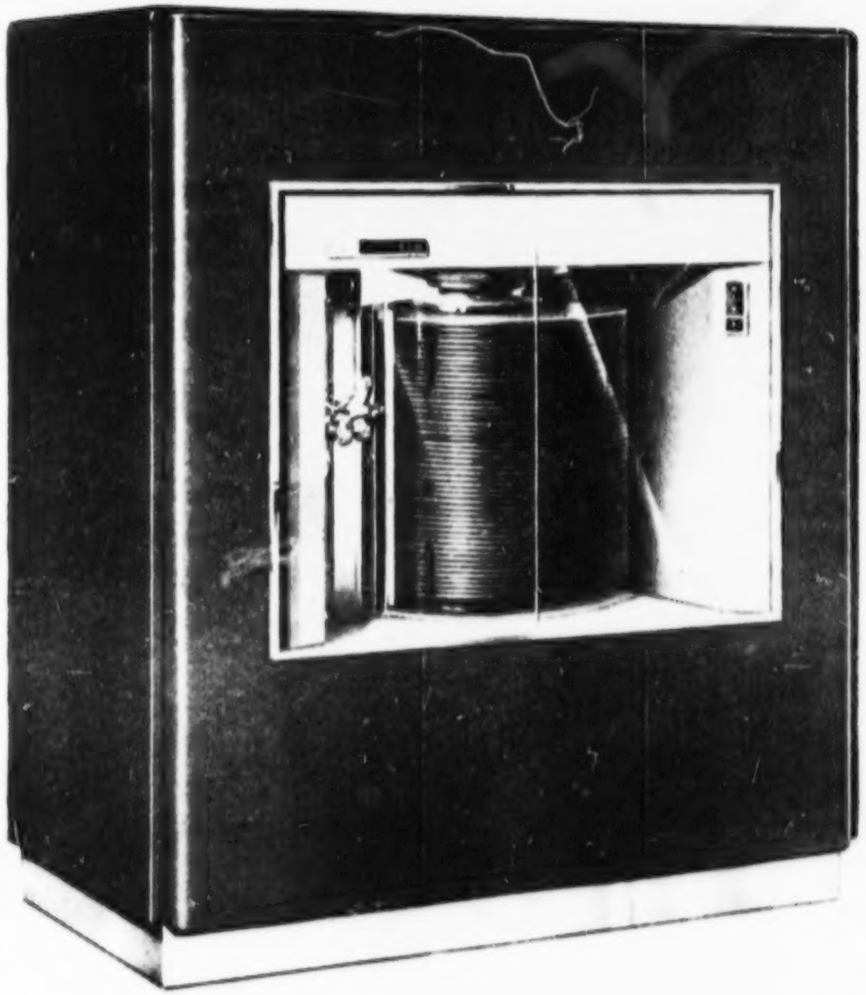


Figure 30
Magnetic Disk

Figure 31
Magnetic Cores

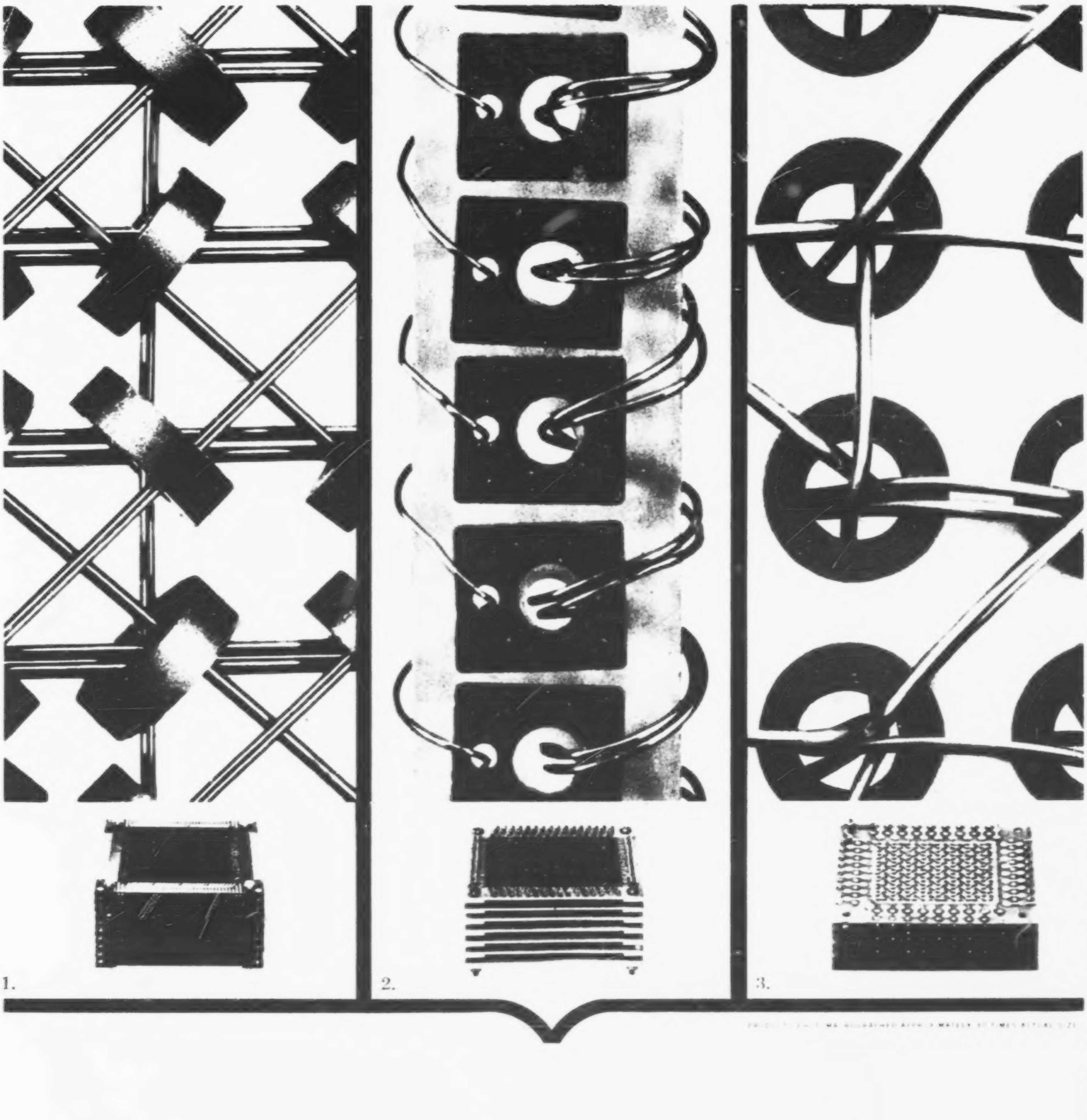


Figure 32
Indexed Microfilm (Eastman Kodak Lodestar)

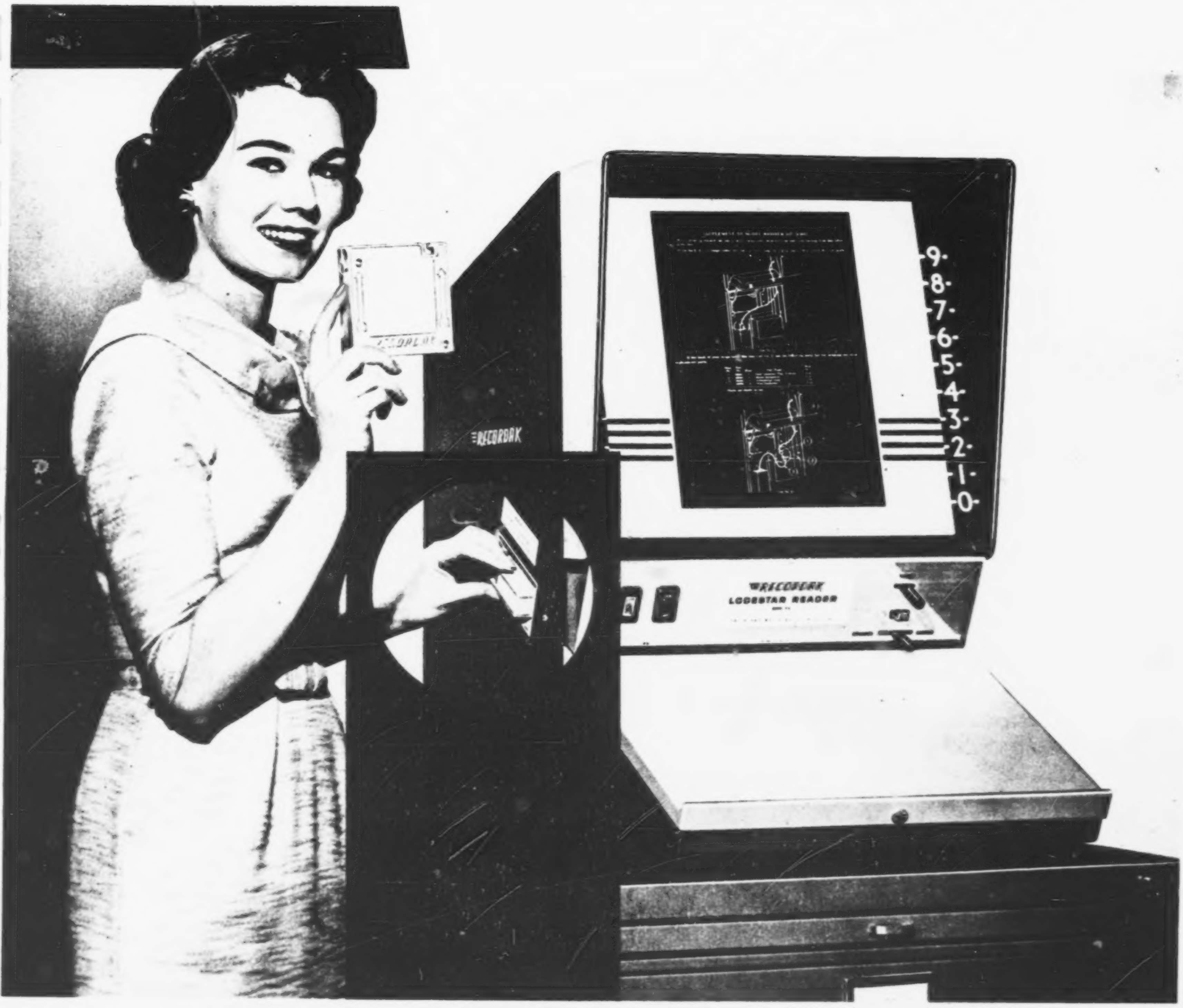

RECORDAK
9
8
7
6
5
4
3
2
1
0
RECORDAK
LODESTAR READER

Figure 33
Coded Microfilm (FMA FileSearch)

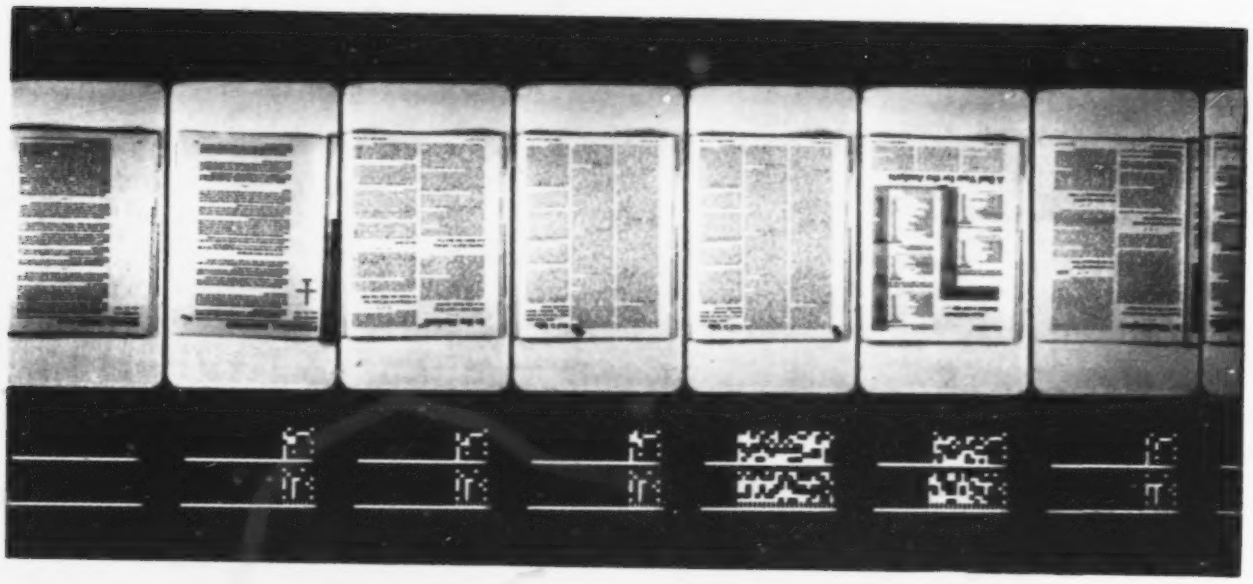


Figure 34
Coded Microfilm Equipment (FMA FileSearch)

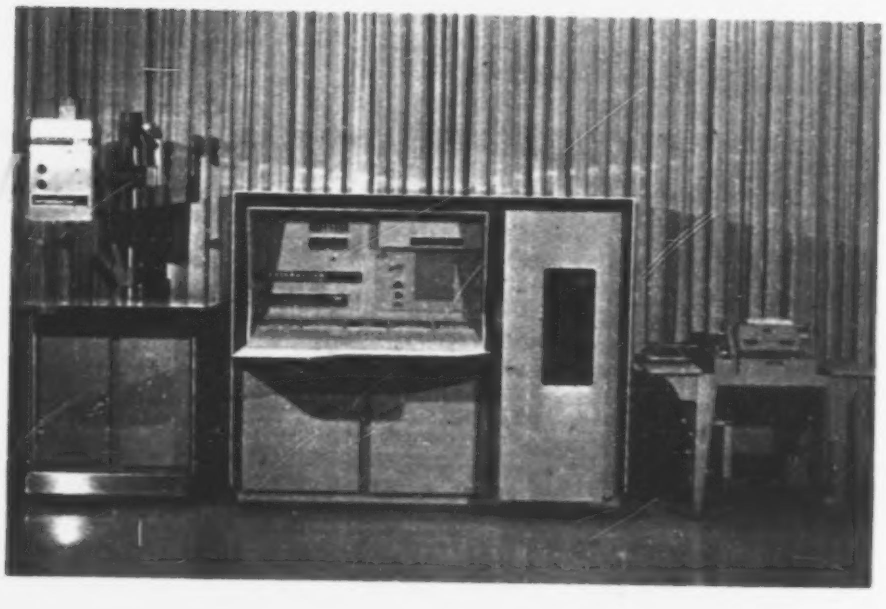
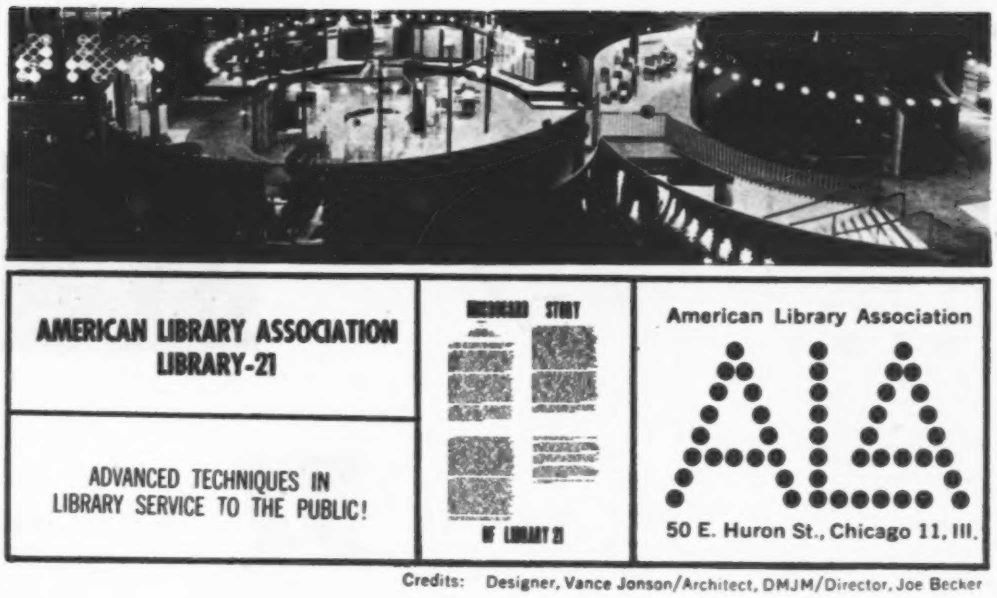


Figure 35
Microcard



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OF LIBRARY 21
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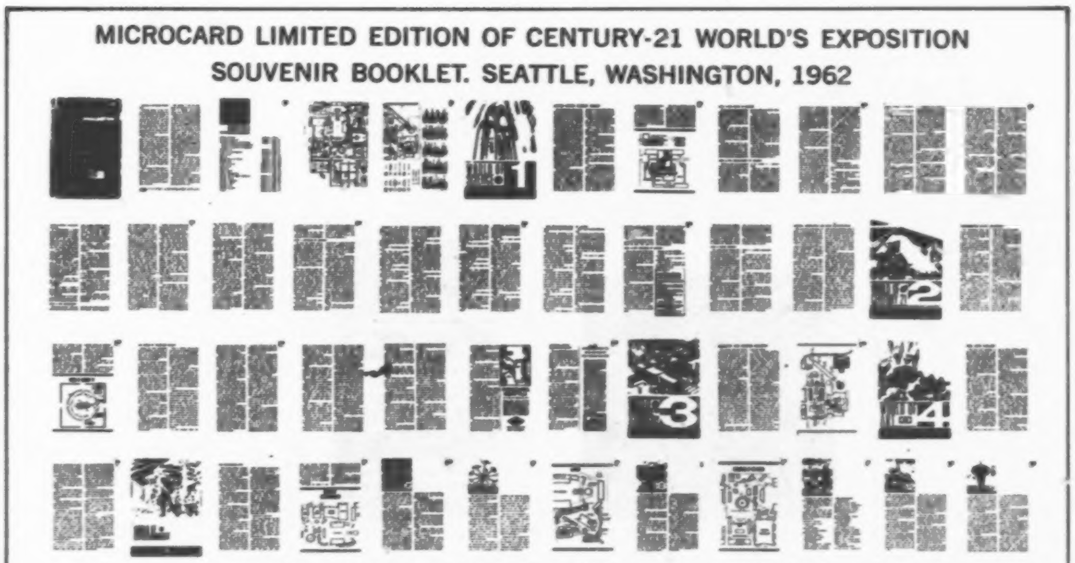
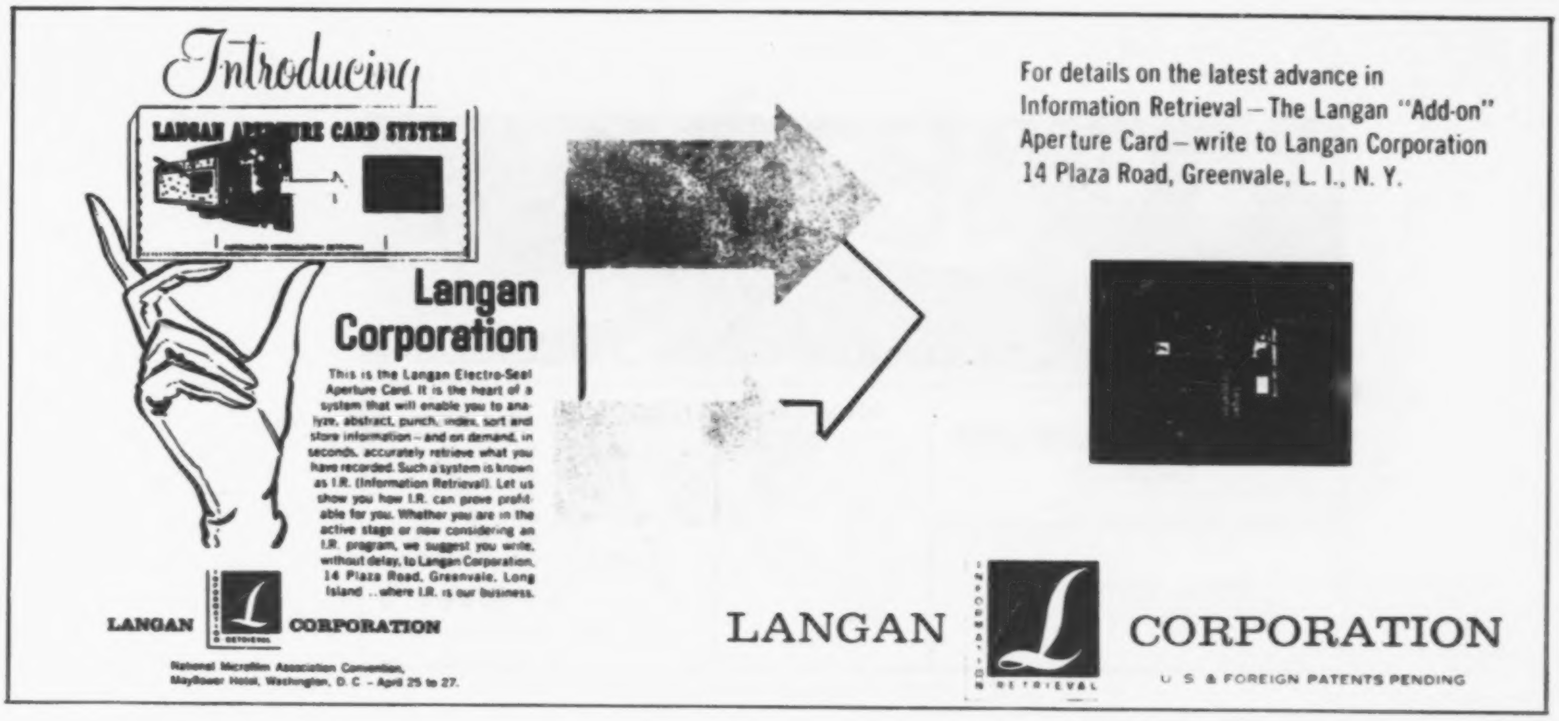


MICROCARD LIMITED EDITION OF CENTURY-21 WORLD'S EXPOSITION
SOUVENIR BOOKLET. SEATTLE, WASHINGTON, 1962

THE MICROCARD CORPORATION

m
microcard

Figure 36
Coded Image Cards (Aperture Card System)


LANGAN AP URE CARD SYSTEM

Introducing

Langan Corporation

This is the Langan Electro-Seal Aperture Card. It is the heart of a system that will enable you to analyze, abstract, punch, index, sort and store information – and on demand, in seconds, accurately retrieve what you have recorded. Such a system is known as I.R. (Information Retrieval). Let us show you how I.R. can prove profitable for you. Whether you are in the active stage or now considering an I.R. program, we suggest you write, without delay, to Langan Corporation, 14 Plaza Road, Greenvale, Long Island ...where I.R. is our business.

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National Microfilm Association Convention,
Mayflower Hotel, Washington, D. C. – April 25 to 27.

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LANGAN CORPORATION

U. S. & FOREIGN PATENTS PENDING

Figure 37
Coded Image Card (Filmorex)

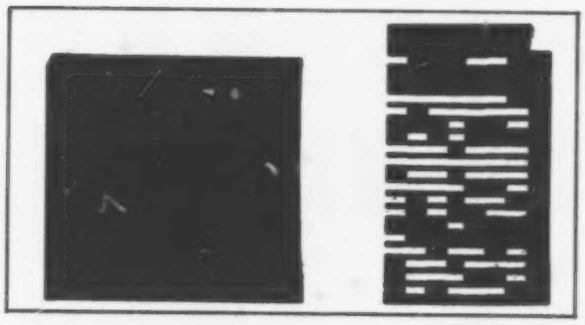

Figure 38
Coded Image Cards (Eastman Kodak Minicard)

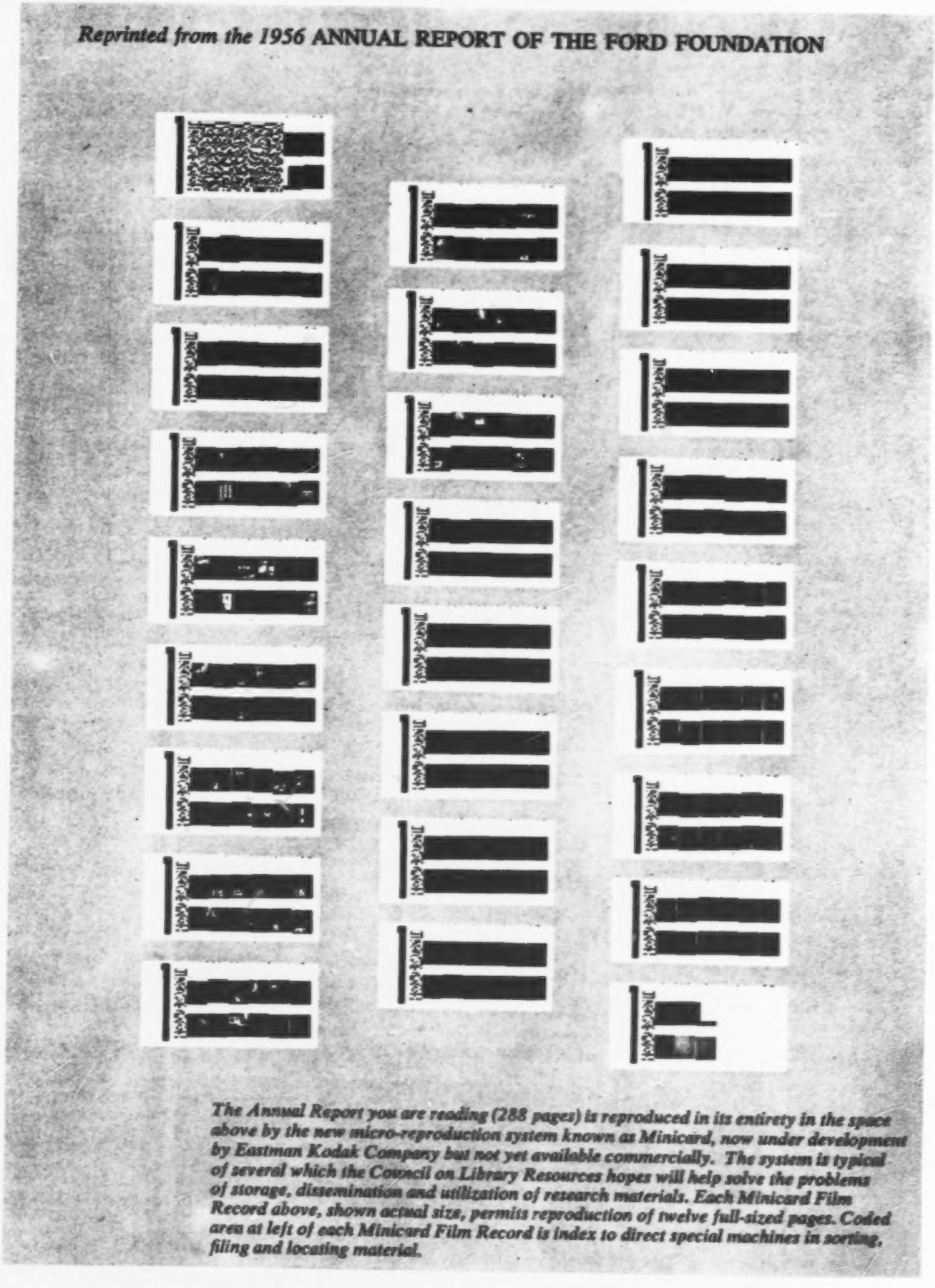

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Figure 39
Indexed Image Card (Magnavox MEDIA)

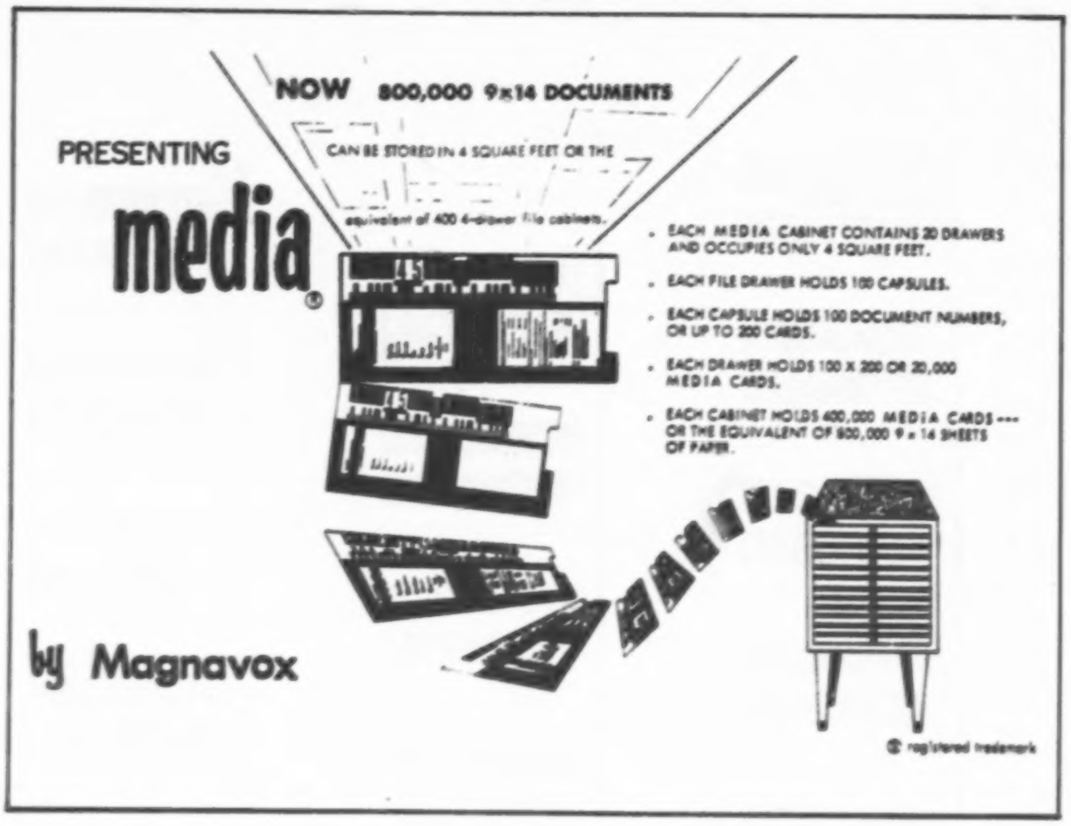

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Figure 40
Indexed Image Card Handling Unit (Magnavox MEDIA)

Figure 41
Program Storage (Burroughs Key Operated Accounting Machine)

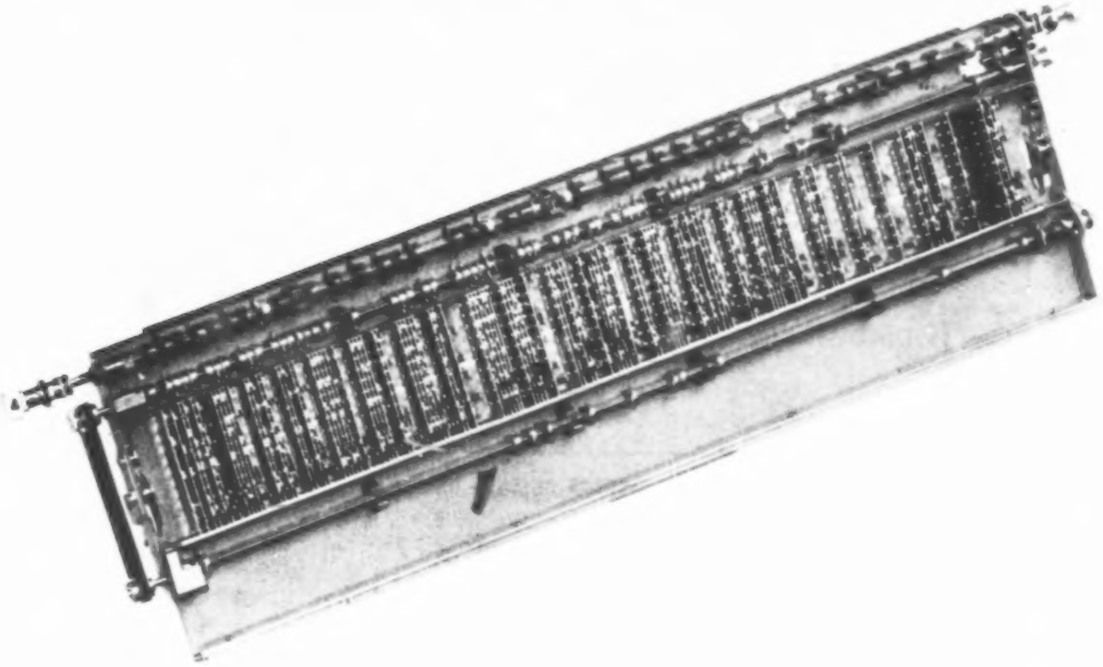


Figure 42
Program Storage (Typical Punched Card Plug Board)

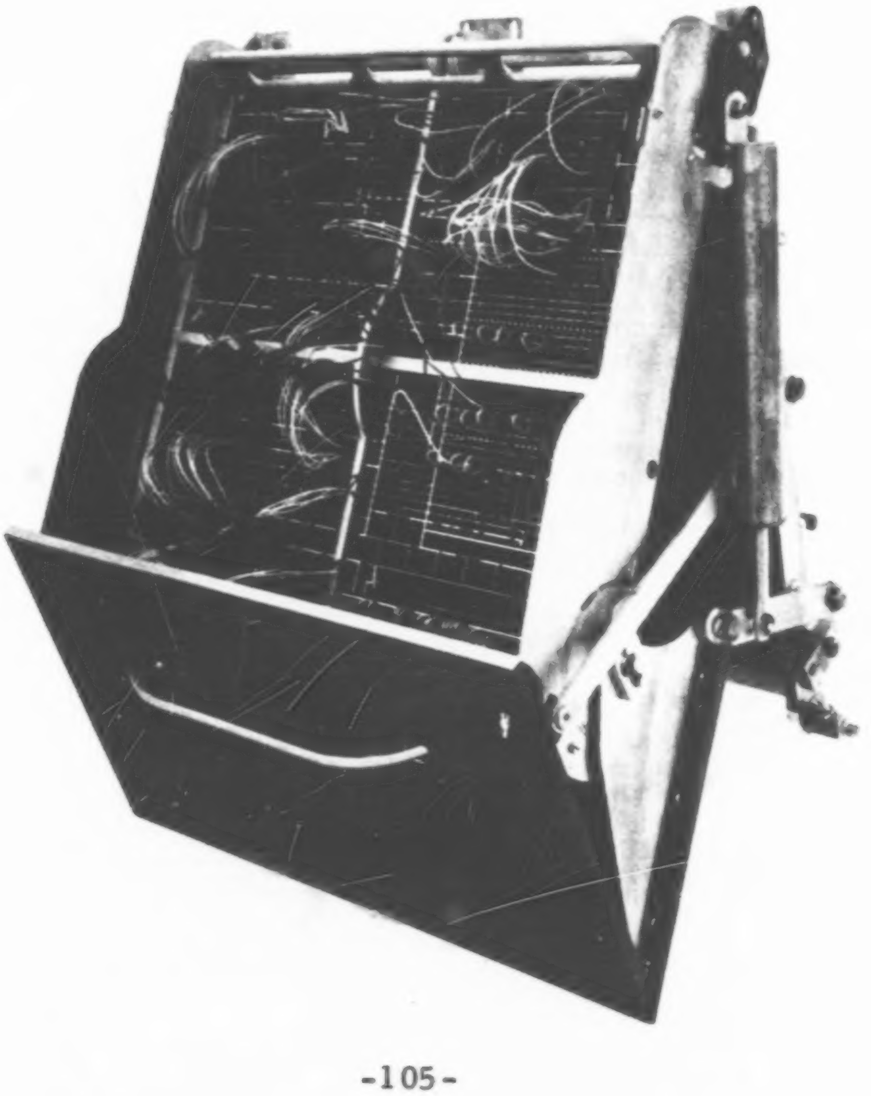
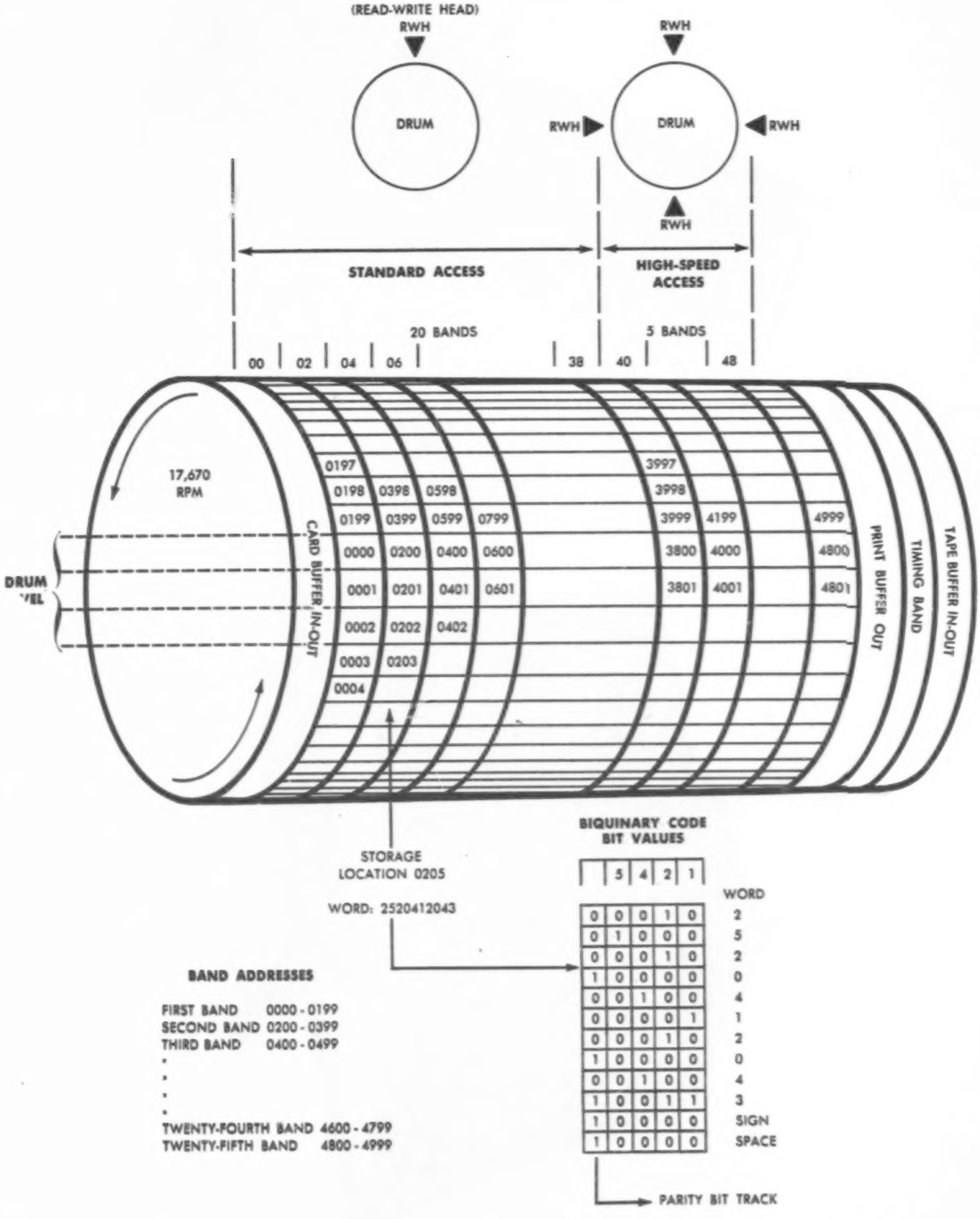


Figure 43
Computer Data and Program Storage


(READ-WRITE HEAD)
RWH
DRUM
RWH
RWH
DRUM
RWH
RWH
STANDARD ACCESS
HIGH-SPEED ACCESS
20 BANDS
5 BANDS
00
02
04
06
38
40
48
17,670 RPM
DRUM
VEL
CARD BUFFER IN-OUT
0197
0198
0398
0598
0199
0399
0599
0799
0000
0200
0400
0600
0001
0201
0401
0601
0002
0202
0402
0003
0203
0004
3997
3998
3999
4199
4999
3800
4000
4800
3801
4001
4801
PRINT BUFFER OUT
TIMING BAND
TAPE BUFFER IN-OUT
STORAGE LOCATION 0205
WORD: 2520412043
BIQUINARY CODE BIT VALUES
PARITY BIT TRACK

BIQUINARY CODE BIT VALUES

	5	4	2	1	WORD
0	0	0	1	0	2
0	1	0	0	0	5
0	0	0	1	0	2
1	0	0	0	0	0
0	0	1	0	0	4
0	0	0	0	1	1
0	0	0	1	0	2
1	0	0	0	0	0
0	0	1	0	0	4
1	0	0	1	1	3
1	0	0	0	0	SIGN
1	0	0	0	0	SPACE

BAND ADDRESSES

FIRST BAND	0000 - 0199
SECOND BAND	0200 - 0399
THIRD BAND	0400 - 0499
.	
.	
.	
.	
TWENTY-FOURTH BAND	4600 - 4799
TWENTY-FIFTH BAND	4800 - 4999

Figure 44
Computer Command Codes

TRANSFER INSTRUCTIONS		
LDA 25	m c	(m) → rA
STA 60	m c	(rA) → m
LDX 05	m c	(m) → rX
STX 65	m c	(rX) → m
LDL 30	m c	(m) → rL
STL 50	m c	(rL) → m
ATL 77	– c	(rA) → rL

MISCELLANEOUS INSTRUCTIONS		
SHL 37	0n00 c	(rA) Shift left n places 0 → LSD positions
SHR 32	0n00 c	(rA), (rX) Shift right n places
BUF 20	m c	"1" bits in m → rA
ERS 35	m c	"0" bits in m → rA
JMP 00	m –	Go to m
STP 67	m c	Stop Computation

ARITHMETIC INSTRUCTIONS		
ADD 70	m c	(m) + (rA) → rA
SUB 75	m c	(rA) - (m) → rA
MUL 85	m c	(rL) x (m) → rA, rX
DIV 55	m c	(m) ÷ (rL) → rA, rX

CLEAR INSTRUCTIONS		
CLA 26	m –	+ 0 → rA
CLX 06	m –	+ 0 → rX
CLL 31	m –	+ 0 → rL
CAA 36	m –	0 → rA, w/sign of rA
CAX 86	m –	0 → rA, rX, w/sign of rL

COMPARE INSTRUCTIONS		
TEQ 82	= ≠	(rA) : (rL)
TGR 87	> ⩽	(rA) : (rL)

Figure 45
Portion of Library 21 Searching Program

PHASE TEST

	a	Op.	m	c	
1	0889	25	0891	0893	This command transfers the contents of 0891 to arithmetic register rA.
2	0891	10	0000	0000	This will be compared with column 76 of the request card.
3	0893	30	4371	0830	This will transfer a word containing column 76 of the request card to arithmetic register rL.
4	0830	82	4000	1233	This compares rA and rL and, if the request was for a great books, the next instruction will be in 4000.
5	1233	25	1235	2037	This transfers the comparison word for a bibliography request to arithmetic register rA.
6	1235	30	0000	0000	This is the comparison word for a bibliography request.
7	2037	82	2010	0849	This compares rA and rL and, if the request was for a bibliography, the next instruction will be in address 2010.
8	0849	25	1251	1453	This picks up the comparison word for a gazetteer request.
9	1251	50	0000	0000	This is the comparison word for a gazetteer request.
10	1453	82	2950	1456	This compares rA and rL and, if the request was for gazetteer information, the next instruction will be in address 2950.
11	1456	67	0411	1244	If all the comparisons fail, column 76 contains an invalid code and the machine halts.

Figure 46

Typical Permuted Title Index

```
                        GAS CHROMATOGRAPHIC ANALYSIS OF OLEF  MARTRL-60-GCA
 CCMPOUNDS SEPARATED BY GAS CHROMATOGRAPHY.                   LOVEJE-60-EAS
IONIZATION DETECTOR FOR GAS CHROMATOGRAPHY.                   MATOUS-60-IDG
L-CONDUCTIVITY CELLS IN GAS CHROMATOGRAPHY                    SCHMLJ-60-RTC
  THEORETICAL PLATES IN GAS CHROMATOGRAPHY.  EFFECTS OF DIST  DUFFJJ-60-TPG
 ACIDS.  FLASH EXCHANGE GAS CHROMATOGRAPHY.                   RALLJW-60-RMS
F SULFUR-35 BY INTERNAL GAS COUNTING.                         MERRWF-60-AAS
      CONDENSABILITY OF GAS FROM THE LENINGRAD DEPOSITS.      VELIAS-60-CGL
                        GAS HYDRATE OF BROMO CHLORO DIFLUORO  GLEWDN-60-GHB
 OF SMALL QUANTITIES OF GAS IN A STREAM.  (GER.)              SIMONW-60-FMM
THYLENE RADICALS IN THE GAS PHASE.                            FIELDW-60-RDR
 THE COMPOSITION OF THE GAS PHASE.                            LEVISD-60-ERP
NSITORY PRODUCTS IN THE GAS PHASE REACTION OF ETHYLENE WITH   HEATAE-60-TPG
             CONTINUOUS GAS TITRATION ANALYZER FOR FLUORINE.  WEBECW-60-CGT
     PRODUCTION OF CITY GAS WITHOUT A YIELD OF COKE BY MEANS  ROSENF-60-PCG
     PRODUCTION OF CITY GAS WITHOUT A YIELD OF COKE BY MEANS  ROSENF-60-PCG
USTION AND FORMATION OF GASEOUS ALKADIENES.                   MASLPG-60-AFD
RED EMISSION SPECTRA OF GASEOUS BORON TRIOXIDE AND BORON DIO  WHITED-60-IES
MISSION SPECTRUM OF THE GASEOUS COMPOUND HYDROGEN- BORON- OX  WHITED-60-IES
ANILINES ON RESPIRATORY GASEOUS EXCHANGE OF TWO CHLOROPHYCED  VILLES-60-AAM
EQUENCY DISPLACEMENT OF GASEOUS HYDROGEN CHLORIDE AND HYDROG  OKSENB-60-IDF
SES FOR THE ANALYSIS OF GASEOUS IMPURITIES IN GASES)          SERISG-60-AAG
SOLUBILITY MAXIUM FOR A GASEOUS MIXTURE COMPONENT IN A LIQUI  NAMIAI-60-SMG
PROPAGATION OF FLAME IN GASEOUS MIXTURES OF OZONE.            YASTVV-60-PCC
             CONTROL OF GASEOUS VEIN FLOWING IN REACTORS.     DROUMR-60-CGV
ORROSION CAUSED BY FLUE GASES.                                ALEXBJ-60-OCL
EMENT OF THE DENSITY OF GASES.                                KRUTZJ-60-MMM
S BY MEANS PERFUSION OF GASES.                                GRUBNO-60-ASP
DIOXIDE ABSORPTION FROM GASES.                                CHERBA-60-ETR
              ACID-FREE GASES.                                SAGOSJ-60-AG
G MIXTURES OF PERMANENT GASES.                                COLLAJ-60-SGC
 DIATOMIC AND MONATOMIC GASES.                                SRIVBN-60-TCB
IDE. INFLUENCED BY RARE GASES.                                OKSENB-60-IDF
L STRENGTH OF LIQUIFIED GASES.                                SWANDW-60-IES
F GASEOUS IMPURITIES IN GASES)                                SERISG-60-AAG
RATE OF THE REACTION OF GASES AND SOLID CARBON.               TESNPA-60-RRG
LS INTERACTION OF LIGHT GASES AND SURFACES.  A NEW METHOD O   FREEMP-60-QMC
IELECTRIC DISPERSION IN GASES AT 400-MEGACYCLES.              BOGGJE-60-DDG
AR DIFFUSION STUDIES IN GASES AT HIGH TEMPERATURE.  RESULTS   WALKRE-60-MDS
DIOLYSIS OF HYDROCARBON GASES AT VERY LOW CONVERSIONS.        BACKRA-60-SSR
N CAS AND OF INDUSTRIAL GASES BY CONTACT MASSES COMPOSED OF   SIMONA-60-CDT
EABILITY OF POLYMERS TO GASES CAUSED BY GAMMA RAYS.           TIKHMS-60-RAP
  SOLUBILITIES OF INERT GASES IN WATER.  0-DEGREES TO NEAR T  HIMMDM-60-SIG
             EFFECTS OF GASES ON IRRADIATED POLYVINYL CHLORI  KURIZ -60-EGI
ME NATURE. DETECTORS OF GASES. LIQUIDS. AND SOLIDS IN THE AI  BERTOA-60-GCE
                        GASIFICATION OF EAST SIBERIAN BROWN   DERBMI-60-GES
                        GAS-COUNTING METHOD FOR DETERMINATIO  SALOT -60-GMD
ZATION BY THE METHOD OF GAS-LIQUID CHROMATOGRAPHY.            MACKLM-60-MHV
ON COLUMN EFFICIENCY IN GAS-LIQUID CHROMATOGRAPHY.            BERNRA-60-EFS
                        GAS-LIQUID CHROMATHERMOGRAPHY.        NERHAG-60-GC
DUSTRY BY THE METHOD OF GAS-LIQUID CHROMATOGRAPHY.            KOROAN-60-APP
                        GAS-LIQUID PARTITION CHROMATOGRAPHY.  SENB  -60-GPC
NATION OF PHOSPHORUS IN GASOLINE.  SPECTROGRAPHIC AND COLOR   GRIFME-60-RDP
 RESISTANCE OF THE FROG GASTRIC MUCOSA.                       HARRJB-60-PTR
ORT OF POTASSIUM BY THE GASTRIC MUCOSA OF THE FROG.           HARRJB-60-TPG
         SELF-QUENCHING GEIGER COUNTERS CONTAINING MIXTURES   COLLAJ-60-SGC
HOTOGRAPHIC ACTIVITY OF GELATIN.                              KURSNV-60-ABA
AL COMPOSITION OF SNAIL GELATIN.                              WILLAP-60-CCS
CATION AND BLEACHING OF GELATIN AND THEIR APPLICATION TO GEL  STEIGA-60-CBG
ND THEIR APPLICATION TO GELATIN PRODUCTS FROM CHROME LEATHER  STEIGA-60-CBG
DIFFERENT COLLAGENS AND GELATINS.                             BELLOJ-60-EGD
                ELASTIN GEL.                                  GRANNH-60-EG
C DERIVATIVES OF SILICA GEL.  (FR.)                           FRIPJJ-60-ODS
F BERYLLIUM FROM SILICA GEL.  (GER.)                          SULCEZ-60-STB
       INHIBITOR OF THE GEL FERMENTATION OF THROMBIN IN BLOO  MARKWF-60-IGF
ACIDS AS A FIXATION FOR GEL PRECIPITATION.                    BERGRB-60-GAP
                        GENERALIZATION OF ALLYLIC TRANSPOSIT  HIGINP-60-GAT
             USE OF THE GENERATION TIME IN REACTOR KINETICS.  LEWINJ-60-UGT
       MEDIATION OF THE GENETIC CONTROL OF PROTEIN SYNTHESIS  WAINSD-60-MGC
S.   IMMUNOCHEMICAL AND GENETIC RELATIONS BETWEEN SIX OF THE  OUDINJ-60-ACP
S OF PLANT GLYCOSIDES.  GENTIOBIOSIDES.                       YAMAHT-60-BPG
 SEVERAL SPECIES OF THE GENUS BETA.                           MARGAJ-60-EGT
IDINE METABOLISM IN THE GENUS DROSOPHILA.                     HUBBJL-60-EPM
SEED POLYPHENOLS OF THE GENUS THEOBROMA.                      GRIFLA-60-CSS
    ANTHOCYANINS OF THE GENUS VITIS.  USE IN THE DIFFERENTIA  RIBERP-60-AGV
                        GEOCHEMISTRY OF GRAYWACKES AND SHALE  WEBEJN-60-GGS
       REDUCTION OF THE GEOMETRIC ISOMERS OF SOME 1.2- DIBRO  MAIRSG-60-RGI
LOXANE CASTING RESINS.  GEOMETRY AND FUNCTIONALITY.           PLUEEP-60-ECR
ISOMERISATION OF METHYL GERANATE AND DIHYDRO MYRCENE          HOWAGA-60-TIM
SURFACE CONDUCTIVITY OF GERMANIUM.                            FISTVI-60-ACS
OTOMAGNETISM ANOMALY IN GERMANIUM.                            MOORAR-60-OPA
OMBINATION RADIATION IN GERMANIUM.                            KOENSM-60-FIE
 OF AN ELECTRON LEAVING GERMANIUM.                            BURSRK-60-EAO
MOBILITY IN SILICON AND GERMANIUM.                            PRIOAC-60-FCM
  OPTICAL ABSORPTION IN GERMANIUM.                            PHILJC-60-OAG
       RELATION BETWEEN GERMANIUM AND THE PETROGRAPHIC COMPO  RATYVM-60-RBG
 REDUCTION REACTIONS ON GERMANIUM CATHODE.                    PLESIV-60-RRG
              GROWTH OF GERMANIUM DENDRITES.                  WAGNRS-60-GGD
M.  INFRARED STUDIES OF GERMANIUM DIOXIDE.                    SHAWER-60-HRS
NS IN THE SODIUM OXIDE- GERMANIUM DIOXIDE- WATER SYSTEM.  IN  SHAWER-60-HRS
RANSVERSE RELUCTANCE IN GERMANIUM IN A FIELD OF UP TO 400-KO  KARAVR-60-[illegible]
ERMANIUM TETRAFLUORIDE. GERMANIUM TETRABROMIDE. AND GERMANIU  KUCIRJ-60-[illegible]
GERMANIUM TETRAHYDRIDE. GERMANIUM TETRAFLUORIDE. GERMANIUM T  KUCIRJ-60-[illegible]
RMODYNAMIC FUNCTIONS OF GERMANIUM TETRAHYDRIDE, GERMANIUM TE  KUCIRJ-60-MPC
ANIUM TETRABROMIDE. AND GERMANIUM TETRAIODIDE. (GER.)         KUCIRJ-60-MPC
YL COMPOUNDS OF SILICON GERMANIUM. AND TIN.                   BROWMP-60-RSM
 DI PYRIDINETETRACHLORO GERMANIUM(IV) AND OF ITS SILICON AND  HULMER-60-CST
EPARATION OF SILYL- AND GERMYLMETALLIC COMPOUNDS.             GEORMV-60-PSG
UM BY HUMAN ERYTHROCYTE GHOSTS.                               HOFFJF-60-RPH
NNIA ELEGANS INDUCED BY GIBBERELLIC ACID.                     THONCA-60-HMS
              EFFECT OF GIBBERELLIC ACID ON HYPOCOTYL GROWTH  FRANKB-60-EGA
              EFFECT OF GIBBERELLIC ACID ON SEEDED GRAPES.    LAVEES-60-EGA
              EFFECT OF GIBBERELLIC ACID ON FLOWER DIFFERENT  CASOOH-60-EGA
           INFLUENCE OF GIBBERELLIN ON PETAL FORMATION OF KA  SCHMAH-60-IGP
              EFFECT OF GIBBERELLIN ON THE FLOWER INITIATION  PURVUN-60-EGF
          EVIDENCE OF A GIBBERELLIN TYPE SUBSTANCE IN SEVERA  MARGAJ-60-EGT
D OF INTEGRATION OF THE GIBBS-DUHEM EQUATION WHEN ACTIVITIES  LAKHML-60-MIG
I-VAR.-SOFIA(ESSENCE OF GINGER GRASS) AND OF C. DENSIFLORUS.  NAVEYR-60-VPM
DUCTION OF 16- ANHYDRO- GITOXIGENIN.  GLYCOSIDES AND AGLYCON  RUSSJH-60-ICT
OZONOLYSIS OF DIACETYL- GITOXIGENIN.  COURSE OF THE ALKALIN   ZINGGM-60-ODG
  COROGLAUCEGENIN. 17A- GITOXIGENIN AS WELL AS A SIMPLIFIED   RUSSJH-60-ICT
THE ACIDITY FUNCTION IN GLACIAL ACETIC ACID.                  BRUCKS-60-IAF
CTS IN HALOGENATIONS IN GLACIAL ACETIC ACID.                  BERLIE-60-IEM
                        GLACIAL ACETIC AND PICRIC ACIDS AS A  BERGRB-60-GAP
TIVITY OF RAT HARDERIAN GLANDS AND LIVERS.                    FIGGFH-60-IHP
INDENTATION STRENGTH OF GLASS.                                ARGOAS-60-ISG
NT OF THE PROPERTIES OF GLASS.                                SILVSI-60-SUC
ONIC AGENTS ADSORBED ON GLASS.                                MINASL-60-CHL
CES IN THE STRUCTURE OF GLASS AND THE PART THEY PLAY IN VISC  SLAVVT-60-NVB
 OF GROWTH PROCESSES IN GLASS DEVITRIFICATION.                BROWSD-60-TDG
                 USE OF GLASS ELECTRODES TO MEASURE ACIDITIE  GLASPK-60-UGE
 OF PARTIALLY SATURATED GLASS FIBER BEDS.                     PARKJD-60-PWP
 CONTAINING MATERIAL IN GLASS FORMATION.                      KHARFY-60-OPS
F FISSION PRODUCTS INTO GLASS FOR DISPOSAL.                   BANCAR-60-IFP
ICATE AS ACCELERATOR IN GLASS MANUFACTURING.                  LITVPI-60-SFS
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E- SILICON DIOXIDE IN A GLASS STATE.                          BEZBMA-60-SSO
NE IONS IN THE GRANITIC GLASSES.* OBSIDIANS AND RETINITES.    CHENEJ-60-ERA
L EVOLUTION OF TEMPERED GLASSES.                              KOVACA-60-PTI
          SOLUBILITY OF GLASSES OF THE SYSTEM LITHIUM OXIDE-  MATVEM-60-SGS
 DIFFUSION OF VAPORS IN GLASSY POLYMERS AND THEIR RELATION T  LONGFA-60-CGD
 ACID CONTENTS OF HORSE GLOBIN AND OF ITS COMPONENT POLYPEPT  HABEAF-60-AAC
OR PREPARATION OF GAMMA GLOBULIN.                             LEVYHB-60-SCM
RYL CONTENT OF B- LACTO GLOBULIN.                             HABEAF-60-SCB
F SEROMUCOIDS AND OF A- GLOBULIN.  (FR.)                      BALLEE-60-GPI
ENTATION OF CRYSTALLINE GLOBULIN FROM CUCURBIT SEEDS.         ANDEDG-60-SCG
LECTIVE UPTAKE OF SERUM GLOBULINS AND GLYCOPROTEINS BY CELLS  KENTHN-60-SUS
        NATURE OF SERUM GLOBULINS WHICH ARE ISOELECTRICALLY   SANDOG-60-NSG
                        GLUCAGON.* A PROTEIN CATABOLIC HORMO  MILLLL-60-GPC
LYTIDAE AND THE SOLUBLE GLUCIDE AND FREE ORGANIC ACID CONTEN  CHARAC-60-RBP
                        GLUCONCOGENESIS FROM GLYCINE AND SER  NADKGB-60-GGS
                        GLUCONO-D- LACTONASE OF PSEUDOMONAS-  JERMMA-60-GLP
  TRIACETYL-N-ACETYL-D- GLUCOSAMINE-1-0- ISOTHIOCYANATE.      MICHEF-60-RDG
ENSATION PRODUCTS OF D- GLUCOSAMINE AND L- TYROSINE WITH POL  MICHEF-60-CPD
        REACTIONS OF D- GLUCOSAMINES.  STRUCTURE OF 3.4.6- T  MICHEF-60-RDG
AZIDE AND N- ACETYL- D- GLUCOSAMINYL- ISONICOTENIC ACID HYDR  NIELSW-60-DIA
TS OF COMMERCIAL LIQUID GLUCOSE.                              PATTSJ-60-DMC
WITH CARBON-14-LABELLED GLUCOSE.                              SPENJF-60-BEG
ATS FROM THE ACETATE OR GLUCOSE.  TRANSFORMATION OF GLUCOSE   PAUNIL-60-FAG
                        GLUCOSE-6- PHOSPHATE DEHYDROGENASE D  GILLHM-60-GPD
           MECHANISM OF GLUCOSE-6- PHOSPHATASE.               HASSLF-60-MGP
          ACTIVATION OF GLUCOSE-6- PHOSPHATE DEHYDROGENASE O  RIMONA-60-AGP
E IN-VITRO.  EFFECTS OF GLUCOSE AND INSULIN ON THE METABOLIS  BALLPR-60-RAT
 OF THE OXIDATION OF D- GLUCOSE BY BROMINE AND BY HYPOBROMOU  PHAYMB-60-KOD
BSORPTION OF 3- METHYL- GLUCOSE FROM THE INTESTINE OF THE FR  CSAKTZ-60-AMG
CTION AND REPRESSION BY GLUCOSE IN AEROBACTER-AEROGENES.      MAGAAK-60-EIR
       DETERMINATION OF GLUCOSE IN BLOOD SERUM BY NEW RAPID   MALMHY-60-DGB
AND CEREBROSPINAL FLUID GLUCOSE IN THE FASTING STATE.         COOPRG-60-BCF
TICN.  CONVERSION OF D- GLUCOSE INTO LIGNIN IN NORWAY SPRUCE  ACERSN-60-LLC
  INHIBITION OF PHOSPHO GLUCOSE ISOMERASE BY D- ERYTHROSE 4-  GRAZIE-60-IPG
   EFFECT OF KINETIN ON GLUCOSE METABOLISM OF CHICKEN EMBRYO  HALEVS-60-EKG
              CARBON-14 GLUCOSE METABOLISM IN BAKER/S YEAST   MOSESV-60-CGM
NOPHOSPHATE PATHWAY FOR GLUCOSE METABOLISM IN HUMAN PANCREAT  FIELJB-60-EHM
            PATHWAYS OF GLUCOSE OXIDATION IN RETINA.          KERLYM-60-PGO
     URIDINEDIPHOSPHATE GLUCOSE PYROPHOSPHORYLASE FROM SKELE  VILLAC-60-UGP
FFICIENT OF SUCROSE AND GLUCOSE SOLUTIONS.                    STIGTD-60-IAS
OSE.  TRANSFORMATION OF GLUCOSE TO FATTY ACIDS BY OXIDATION   PAUNIL-60-FAG
ADAPTATION TO FRUCTOSE. GLUCOSE. AND MANNOSE EXHIBITED.       EAGORG-60-EPA
) BONDS BY FUNGAL AMYLO GLUCOSIDASE.                          PAZUJH-60-HGO
          HYDROLYSIS OF GLUCOSYL OLIGOSACCHARIDES WITH A-D-(  PAZUJH-60-HGO
         4-O- METHYL-D- GLUCURONIC ACID.                      BOWEWD-60-MGA
LYCINE. ALANINE. AND D- GLUCURONIC ACID.                      HEYNSK-60-ADF
E CONCENTRATION OF HIDE GLUE BY THE REFRACTOMETRIC METHOD.    SUROSP-60-DCH
METABOLISM OF CARBON-14 GLUOCSE AND 2- CARBON-14 ACETATE IN   SMITMJ-60-ESD
LUORO- OXALOACETATE AND GLUTAMATE- ASPARTATE TRANSAMINASE OF  KUNE  -60-IBB
        SEPARATION OF 2 GLUTAMIC- OXALACETIC TRANSAMINASES B  FLEIGA-60-SGO
ON OF ASPARTIC ACID AND GLUTAMIC ACID.                        HARADK-60-TCA
UTAMINASE-I ACTIVITY TO GLUTAMIC ACID CONCENTRATION IN THE R  GOLDSL-60-RGA
UBSTRATE SPECIFICITY OF GLUTAMIC ACID DEHYDROGENASE.          STRUCJ-60-SSG
            RELATION OF GLUTAMINASE-I ACTIVITY TO GLUTAMIC A  GOLDSL-60-RGA
                  RENAL GLUTAMINASE-I DISTRIBUTION AND AMMON  WEISMB-60-HGD
YMES.* REQUIREMENTS FOR GLUTAMINE AND GUANOSINE NUCLEOTIDES.  HURLRB-60-FCN
                        GLUTATHIONE PEROXIDASE AND THE DESTR  MILLGC-60-GPD
                        GLUTATHIONE REDUCTASE OF THIOBACILLU  SUZUKI-60-GRT
INE CAROTENOL FROM CORN GLUTEN.                               PETZEN-60-ZXC
NOWN REACTION OF THE D- GLYCERALDEHYDE-3- PHOSPHATE DEHYDROG  KELETT-60-PUR
TRANSFERASE AND PHOSPHO GLYCERALDEHYDE DEHYDROGENASE IN IODO  PADIEP-60-CPT
  )-2- DEOXY-2- FLUORO- GLYCERIC ACID AND ITS QUININE SALTS.  KENTPW-60-FCC
                        GLYCERIC ACID KINASE ISOLATED FROM A  OZAKIK-60-GAK
)- SODIUM PYRUVATE INTO GLYCERIDE GLYCEROL IN DIABETIC AND N  SAVAGN-60-III
HE POLYMORPHIC FORMS OF GLYCERIDES.                           CHAPMD-60-NRS
PIC CHARACTERIZATION OF GLYCERIDES.                           CHAPMD-60-ISC
YL ETHER AND EPOXIDIZED GLYCERIDES CURED WITH PHTHALIC ANHYD  GELBLL-60-ERF
TA AND ITS ANALOGUES ON GLYCERINATED MUSCLE FIBERS AND MYOSI  EBASHS-60-EEI
TUDY OF THE BORIC ACID- GLYCERIN COMPLEX.  SOLUBILITY OF BO   SCIAJJ-60-SSB
BILITY OF BORIC ACID IN GLYCERIN SOLUTION AT 25-DEGREE.       SCIAJJ-60-SSB
 TYPES OF MUSCLE AND ON GLYCEROL-EXTRACTED PSOAS FIBRES.      KAMINB-60-EHW
NTHESIS OF A 3- BATYL ( GLYCEROL 2-OCTADECYL ETHER) ANALOGUE  BEVATH-60-SBB
HESIS OF ERYTHRITOL AND GLYCEROL BY TORULOPSIS-MAGNOLIAE.  S  SPENJF-60-BEG
UDY OF THE OXIDATION OF GLYCEROL BY VANADIUM(V).              WESTDM-60-KSO
PYRUVATE INTO GLYCERIDE GLYCEROL IN DIABETIC AND NORMAL BABO  SAVAGN-60-III
     PRODUCTION OF L-A- GLYCEROPHOSPHATE DURING ANAEROBIC GL  CIACEI-60-PLG
SIS OF DIPALMITOYL-L-A- GLYCERO PHOSPHORIC ACID DERIVATIVES.  STANNZ-60-SDG
DIATES FOR SYNTHESIS OF GLYCERYL PHOSPHATIDES.                STANNZ-60-SDG
   GLUCONCOGENESIS FROM GLYCINE AND SERINE IN THE RAT.        NADKGB-60-GGS
UCTURON-AMINOACID) FROM GLYCINE. ALANINE. AND D- GLUCURONIC   HEYNSK-60-ADF
    INHIBITION OF YEAST GLYCLGLYCINE DIPEPTIDASE BY AMINO AC  NISHIA-60-IYG
 REQUIREMENT FOR SODIUM GLYCOCHOLATE IN THE INTESTINAL CONVE  OLSOJA-60-RSG
ESTIGATION OF A CASE OF GLYCOGEN-STORAGE DISEASE (VON-GIERKE  CALDEA-60-BIC
Y OF THE ENZYMES OF THE GLYCOGEN CYCLE IN RAT TISSUES.        VILLAC-60-LAE
     INSULIN-STIMULATED GLYCOGEN FORMATION IN RAT DIAPHRAGM.  LARNEJ-60-IGF
 MICROBIAL OXIDATION OF GLYCOLLATE VIA A DICARBOXYLIC ACID C  KORNHL-60-MOG
 POLYPHOSPHORIC ACID ON GLYCOLS.  (FR.)                       CHERBE-60-FTE
L STEROIDS IN ANAEROBIC GLYCOLYSIS BY CELL-FREE PREPARATIONS  BLECHM-60-LAA
         SUPPRESSION OF GLYCOLYSIS IN CANCEROUS CELLS BY PRO  EMANNM-60-SGC
STRATE AND INHIBITOR OF GLYCOLYSIS IN FUNGI.                  SOLSA -60-DMS
TS WITH RESPIRATION AND GLYCOLYSIS IN MUSCLE.                 MULLEM-60-CIS
SPHATE DURING ANAEROBIC GLYCOLYSIS IN NORMAL AND MALIGNANT T  CIACEI-60-PLG
               ANEROBIC GLYCOLYSIS OF DISPERSED CELL SUSPENS  ZIMMEM-60-AGD
ED COLD EXPOSURE ON THE GLYCOLYTIC ENZYMES OF LIVER AND MUSC  HANNJP-60-EPC
 OF SERUM GLOBULINS AND GLYCOPROTEINS BY CELLS GROWING IN VI  KENTHN-60-SUS
ACIDS OF THE BARIUM-A2- GLYCOPROTEINS OF NORMAL HUMAN PLASMA  DUSK  -60-TAA
                        GLYCO PROTEIN INDEX ON THE RELATION   BALLEE-60-GPI
GENEIN AND PACHYGENOL.  GLYCOSIDE AND AGLYCONE. (GER.)        FIESLF-60-CPP
  BIOSYNTHESIS OF PLANT GLYCOSIDES.  GENTIOBIOSIDES.          YAMAHT-60-BPG
  BIOSYNTHESIS OF PLANT GLYCOSIDES.  MONOGLUCOSIDES.          YAMAHT-60-BPG
SPOT REACTION FOR HEART GLYCOSIDES.  (GER.)                   SEGEKH-60-ISR
 ANHYDRO- GITOXIGENIN.  GLYCOSIDES AND GLYCONES.  (GER.)      RUSSJH-60-ICT
                  TRANS GLYCOSILASES OF NON-PHOSPHOPOLYTIC T  PETRAN-60-TGN
       REACTION BETWEEN GLYCURONEMIA AND BILIRUBINEMIA.       PITTEA-60-RBG
COLOGICAL PROPERTIES OF GLYCYRRHETINIC ACID HYDROGEN SUCCINA  FINNRS-60-PPG
                 METHYL GLYOXAL FORMATION FROM AMINO- ACETON  ELLIMM-60-MGF
ON OF SUGARS ACROSS THE GOAT PLACENTA.                        WALKDG-60-TSA
PHITE) + CHLORINE (GAS) GOES TO URANIUM(IV)- OXYCHLORIDE (SO  SMIRNV-60-TSH
   EXPERIMENTAL COLLOID GOITRE IN SOME VIVIPAROUS TOOTHCARPS  STOLKA-60-ECG
F-LIVES OF THE NUCLIDES GOLD-195. PLATINUM-195M. AND PLATINU  BRESEM-60-HNG
SONANCE FLUORESCENCE IN GOLD-197.                             NAGLED-60-NRF
ED IN THE PROCESSING OF GOLD-BEARING ORES.                    ZVYADE-60-EGC
IN-BOUNDARY ENERGIES IN GOLD- COPPER ALLOYS.                  MILLJE-60-GEG
 AND INTER-DIFFUSION IN GOLD- NICKEL ALLOYS.. CORRELATION WI  ARMSRW-60-DSI
KEL- COPPER AND NICKEL- GOLD ALLOYS.                          ORIARA-60-HFS
RAL GROWTH OF COLLOIDAL GOLD AND MOIRE FRINGE.                SUITOE-60-SGC
N THE ALLOYS COPPER(3)- GOLD AND NICKEL(3)- IRON.             HOVIV -60-ELR
 CRYSTALLINE DEFECTS IN GOLD FILMS OBTAINED BY EVAPORATION U  DESPMJ-60-CDG
          EXTRACTION OF GOLD FROM CYANIDE SOLUTIONS. OBTAINE  ZVYADE-60-EGC
 MICRO-DETERMINATION OF GOLD WITH P-DIMETHYLAMINOBENZYLIDENE  COTTTM-60-MGP
F COPPER- GOLD. SILVER- GOLD. NICKEL- COPPER. AND SILVER- CO  LICHBD-60-ACG
      ATTACK OF COPPER- GOLD. SILVER- GOLD. NICKEL- COPPER.   LICHBD-60-ACG
STIS TO HUMAN CHORIONIC GONADOTROPIN.                         LOSTAJ-60-VRM
ASTOR BEANS YIELDS HIGH GRADE OIL.                            DAJUEL-60-DSC
RATION OF SEMICONDUCTOR GRADE SILICON BY FILM BOILING.        ELLIRC-60-APS
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Figure 47
Typical Auto-Abstract

Exhibit 2 REPRODUCED BY PERMISSION

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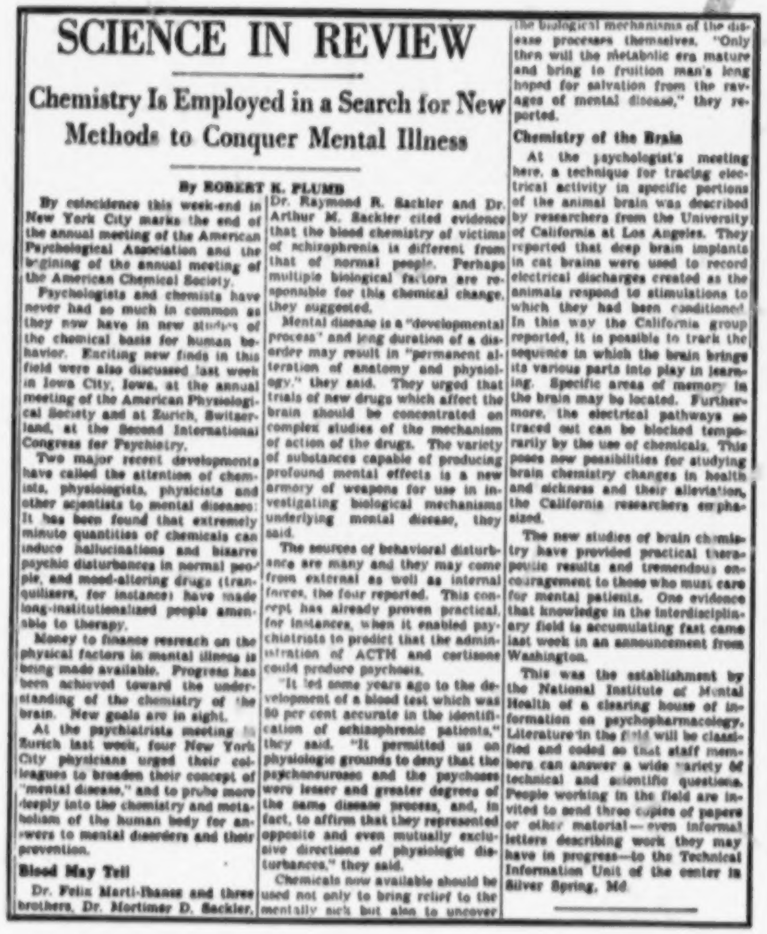
Title: Chemistry Is Employed in a Search for New Methods to Conquer Mental Illness

Author: Robert K. Plumb



SCIENCE IN REVIEW

Chemistry Is Employed in a Search for New Methods to Conquer Mental Illness

By ROBERT K. PLUMB

By coincidence this week-end in New York City marks the end of the annual meeting of the American Psychological Association and the beginning of the annual meeting of the American Chemical Society.

Psychologists and chemists have never had so much in common as they now have in new studies of the chemical basis for human behavior. Exciting new finds in this field were also discussed last week in Iowa City, Iowa, at the annual meeting of the American Physiological Society and at Zurich, Switzerland, at the Second International Congress for Psychiatry.

Two major recent developments have called the attention of chemists, physiologists, physicists and other scientists to mental diseases: It has been found that extremely minute quantities of chemicals can induce hallucinations and bizarre psychic disturbances in normal people, and mood-altering drugs (tranquilizers, for instance) have made long-institutionalized people amenable to therapy.

Money to finance research on the physical factors in mental illness is being made available. Progress has been achieved toward the understanding of the chemistry of the brain. New goals are in sight.

At the psychiatrists meeting in Zurich last week, four New York City physicians urged their colleagues to broaden their concept of "mental disease," and to probe more deeply into the chemistry and metabolism of the human body for answers to mental disorders and their prevention.

Blood May Tell

Dr. Felix Marti-Ibanez and three brothers, Dr. Mortimer D. Sackler, Dr. Raymond R. Sackler and Dr. Arthur M. Sackler cited evidence that the blood chemistry of victims of schizophrenia is different from that of normal people. Perhaps multiple biological factors are responsible for this chemical change, they suggested.

Mental disease is a "developmental process" and long duration of a disorder may result in "permanent alteration of anatomy and physiology," they said. They urged that trials of new drugs which affect the brain should be concentrated on complex studies of the mechanism of action of the drugs. The variety of substances capable of producing profound mental effects is a new armory of weapons for use in investigating biological mechanisms underlying mental disease, they said.

The sources of behavioral disturbance are many and they may come from external as well as internal forces, the four reported. This concept has already proven practical, for instance, when it enabled psychiatrists to predict that the administration of ACTH and cortisone could produce psychosis.

"It led some years ago to the development of a blood test which was 80 per cent accurate in the identification of schizophrenic patients," they said. "It permitted us on physiologic grounds to deny that the psychoneuroses and the psychoses were lesser and greater degrees of the same disease process, and, in fact, to affirm that they represented opposite and even mutually exclusive directions of physiologic disturbances," they said.

Chemicals now available should be used not only to bring relief to the mentally sick but also to uncover the biological mechanisms of the disease processes themselves. "Only then will the metabolic era mature and bring to fruition man's long hoped for salvation from the ravages of mental disease," they reported.

Chemistry of the Brain

At the psychologist's meeting here, a technique for tracing electrical activity in specific portions of the animal brain was described by researchers from the University of California at Los Angeles. They reported that deep brain implants in cat brains were used to record electrical discharges created as the animals respond to stimulations to which they had been conditioned. In this way the California group reported, it is possible to track the sequence in which the brain brings its various parts into play in learning. Specific areas of memory in the brain may be located. Furthermore, the electrical pathways so traced out can be blocked temporarily by the use of chemicals. This poses new possibilities for studying brain chemistry changes in health and sickness and their alleviation, the California researchers emphasized.

The new studies of brain chemistry have provided practical therapeutic results and tremendous encouragement to those who must care for mental patients. One evidence that knowledge in the interdisciplinary field is accumulating fast came last week in an announcement from Washington.

This was the establishment by the National Institute of Mental Health of a clearing house of information on psychopharmacology. Literature in the field will be classified and coded so that staff members can answer a wide variety of technical and scientific questions. People working in the field are invited to send three copies of papers or other material—even informal letters describing work they may have in progress—to the Technical Information Unit of the center in Silver Spring, Md.

Exhibit 2 **Auto-Abstract**

Two major recent developments have called the attention of chemists, physiologists, physicists and other scientists to mental diseases: It has been found that extremely minute quantities of chemicals can induce hallucinations and bizarre psychic disturbances in normal people, and mood-altering drugs (tranquilizers, for instance) have made long-institutionalized people amenable to therapy. (4.0)

This poses new possibilities for studying brain chemistry changes in health and sickness and their alleviation, the California researchers emphasized. (5.4)

The new studies of brain chemistry have provided practical therapeutic results and tremendous encouragement to those who must care for mental patients. (5.4)

A condensation of a document to a given fraction of the original could be readily accomplished with the system outlined by adjusting the cutoff value of sentence significance. On the other hand, a fixed number of sentences might be required irrespective of document length. Here it would be a simple matter to print out exactly that number of the highest ranking sentences which fulfilled the requirement.

In many instances condensations of documents are made emphasizing the relationship of the information in the document to a special interest or field of investigation. In such cases sentences could be weighted by assigning a premium value to a predetermined class of words.

These two features of the auto-abstract, variable length and emphasis, might at times be usefully combined. In the case of a long, comprehensive paper, several condensed versions could be prepared, each of a length suitable to the requirements of its recipient and biased to his particular sphere of interest.

Along these same lines, a specificity ranking technique might prove feasible. If none of the sentences in an article attained a certain significance factor, it would be possible to reject the article as too generalized for the purpose at hand.

In certain cases an abstract might be amplified by following it with an enumeration of specifics, such as names of persons, places, organizations, products, materials, processes, et cetera. Such specific words could be selected by the machine either because they are capitalized or by means of lookup in a stored special dictionary.

Auto-abstracting could also be used to alleviate the translation burden. To avoid total translation initially, auto-abstracts of appropriate length could be produced in the original language and only the abstracts translated for subsequent analysis.

Finally, the process of deriving key words for encoding documents for mechanical information retrieval could be simplified by auto-abstracting techniques.

Conclusions

The results so far obtained for technical articles have indicated the feasibility of automatically selecting sentences that will indicate the general subject matter, very much as do conventional abstracts. What such auto-abstracts might lack in sophistication they will more than compensate for by their uniformity of derivation. Because of the absence of the variations of human capabilities and orientation, auto-abstracts have a high degree of reliability, consistency, and stability, as they are the product of a statistical analysis of the author's own words. In many cases the abstract obtained is the type generally referred to as the "indicative" abstract.

Once auto-abstracts are generally available, their users will learn how to interpret them and how to detect their implications. They will realize, for instance, that certain words contained in the sample sentences stand for notions which must have been elaborated upon somewhere in the article. If this were not so for a substantial portion of the words in the selected sentences, these sentences could not have attained their status based on word frequency.

There is, of course, the chance that an author's style of writing deviates from the average to an extent that might cause the method to select sentences of inferior significance. Since the title of the paper is always given in conjunction with the auto-abstract, there is a high probability that it will favorably supplement the abstract. However, there will always be a residue of inadequate results, and it appears to be entirely feasible to establish criteria by which a machine may recognize such exceptions and earmark them for human attention.

If machines can perform satisfactorily within the range outlined in this paper, a substantial and worthwhile saving in human effort will have been realized. The auto-abstract is perhaps the first example of a machine-generated equivalent of a completely intellectual task in the field of literature evaluation.

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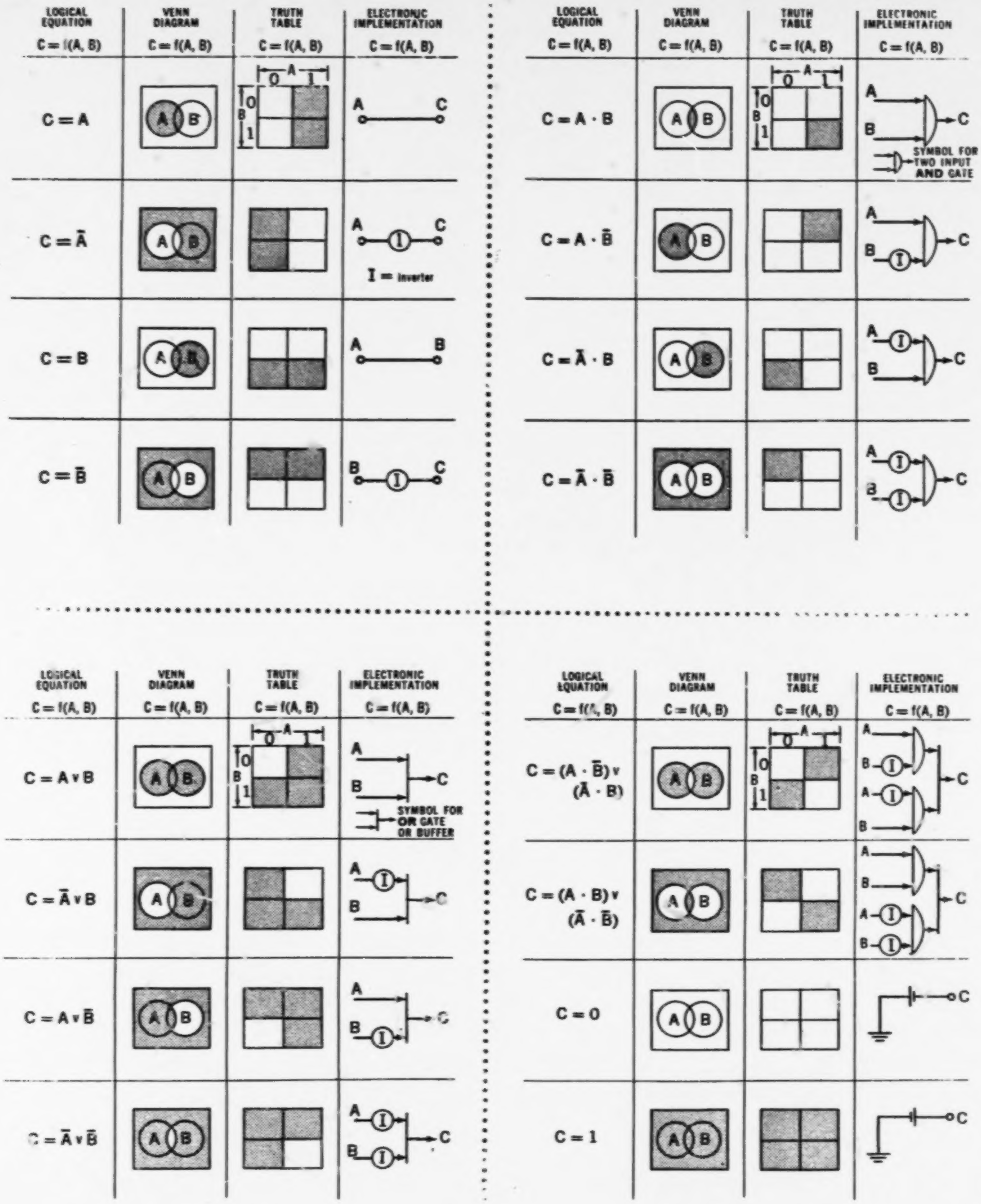
Figure 48
The Boolean Functions of Two Variables


LOGICAL EQUATION C = f(A, B)
VENN DIAGRAM C = f(A, B)
TRUTH TABLE C = f(A, B)
ELECTRONIC IMPLEMENTATION C = f(A, B)
C = A
C = Ā
C = B
C = B̄
I = inverter
C = A · B
C = A · B̄
C = Ā · B
C = Ā · B̄
SYMBOL FOR TWO INPUT AND GATE
C = A v B
C = Ā v B
C = A v B̄
C = Ā v B̄
SYMBOL FOR OR GATE OR BUFFER
C = (A · B̄) v (Ā · B)
C = (A · B) v (Ā · B̄)
C = 0
C = 1
A
B
C
0
1

APPENDIX D TO SECTION II

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SECTION III

IMPLICATIONS OF THE LIBRARY 21 EXHIBIT FOR LIBRARY EDUCATION

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For the purposes of examining the implications of the LIBRARY 21 Exhibit for the field of library education there are specific items to be noted: First, in the lectures and discussions which constituted the one week special program of education for the professional library staff (Dr. Robert Hayes' instructional responsibility); second, the discussions at the special seminar conducted toward the close of each week's instruction for the members of the arriving staff and the members of the retiring staff; and third, the day-to-day work of the professional library staff during the four or five week period of service at the LIBRARY 21 Exhibit.

In analyzing these implications it seems wise to think in terms of the current curriculum of the accredited library schools of the country. Therefore, the paragraphs that follow are arranged in the broad subject areas of present day library school curricula.

INTRODUCTION TO LIBRARIANSHIP CURRICULUM.

It was emphasized again and again that there continues to be a need for accentuating recruitment for librarianship in the basic orientation course at most library schools. It was also evident that the ability of the librarian in developing publicity and achieving successful public relations programs was constantly being challenged at the exhibit. Particular reference to Public Library Service, a Guide to Evaluation with Minimum Standards, and Standards for School Library Programs, with their documented approach for library systems and a concern for the larger administrative unit in library services might be emphasized in the curriculum so that the staff could have spoken with more authority to LIBRARY 21 visitors concerning library development.

THE TECHNICAL SERVICES CURRICULUM.

In fields of acquisitions processes and bibliographic control there must be better understanding of the range of library resources and their interdependence. The LIBRARY 21 staff reported that not enough emphasis is given in library schools to the document, the technical report, the near-print research study or other means of communication not so definite in appearance as the bound book or the slick magazine. Regarding the subject of organization of materials (particularly acquisitions, classification, and cataloging) the exhibit staff recommended that the librarian of today must understand more fully the theory of classification systems as it affects all information. Not only was the matter of synthesis significant, but also the need for analysis which could only be met by the greatest flexibility and imaginative creativity on the part of the librarian. LIBRARY 21 staff members concluded that it is insufficient to bring to the students' attention the development of the Dewey classification scheme, or even that of the Library of Congress. The broadest possible approach to the organization of knowledge must be emphasized before any attempt is made to explain the existing classification schemes. Earlier, the importance of the near-print and other ephemeral reports was mentioned; equal emphasis should be placed on the other media of communication, namely, film, filmstrip, recording -- both tape and disc -- and the variety of micro-forms. The LIBRARY 21 Reference, Learning Resources Center and general staff recognized that it was working with the organization of materials in every conceivable format at the Exhibit and in the future in its own libraries throughout the United States.

LIBRARY SERVICE FOR CHILDREN AND YOUTH.

From the point of view of children's services in the public library and in the school library, the LIBRARY 21 staff could see the necessity for a clearer definition of each type of service. Today's schools must offer a variety of services working with children, youth and even adults in order to accentuate quality education as well as the newer media such as radio, television, the teaching machine, and the concepts of team teaching with approaches to the larger class and the smaller group. Spaces for individual study, rather than central libraries only, in school buildings may form the pattern of school library service for the future. Quest Spaces or model study areas where students could work with all resources on their own seem particularly necessary for honors programs and programs of accelerated learning. In such a space, a student, with careful guidance by his teacher and/or his librarian, would have access to resources beyond those being used in the traditional classroom situation. From the district level Learning Resources Center of the school program it would also be possible to call upon additional material or equipment which could be served to the student through electronic means directly in his Quest Space, or by making available special materials or specific equipment on temporary loan. It is also essential that the materials in the public library or in the school library go far beyond the book collection. All the media of communication must be brought into play, not only for the informal value, but also because other approaches than print may result in better learning and improved education.

ADMINISTRATION OF LIBRARIES CURRICULUM.

The LIBRARY 21 staff suggested that in the field of organization and administration of libraries we may find the greatest need for new areas of concern in library education. With the growth of automatic data processing and mechanization of clerical processes, the library school student must become cognizant of a differing responsibility in the libraries of tomorrow. First and foremost, there must be careful analysis of library methods, particularly in the technical services areas, and a sharp understanding of costs, so that libraries will be able to secure the monies to support the programs being planned and discussed in these implications. Once again, for greater efficiency and economy in administration, the optimum-sized unit for best library service must be explained and given real meaning to the students joining the staffs of libraries in the field.

As a new area of subject matter for most library schools, although progress must be reported from experience at Simmons College and Columbia University, the LIBRARY 21 staff requested instruction in "inter-personal relations" for the librarian of today. Again and again the need for skills and knowledge for working with the public as a representative of a tax-supported agency or working within the staff as a supervisor, provided situations with which the new librarian had to cope. The case study seems to offer great assistance as a teaching method. Regardless of method, however, it was most evident to the professional librarians on duty at LIBRARY 21 that they needed to develop extrovert qualities in order to tell the library story and actively serve the library patron rather than passively wait to be asked for assistance. The recommendation continued to be made by the LIBRARY 21 staff that the initiative of service in literature searching or responding to inquiry must be the responsibility of the librarian so that the broad range of man's developing knowledge not go untapped as we move into the 21st century. To do this, the major consideration seemed to be improved communication between the user of the information mechanism and the operator of the system.

INFORMATION SCIENCE CURRICULUM.

Now we must examine the central purpose of the special one week program of education for the LIBRARY 21 staff. As described in Section I and II by both Mr. Martin and Dr. Hayes, that purpose was: (a) To provide the professional librarian exhibit staff with sufficient familiarity with the equipment so that they could answer questions concerning it with confidence; (b) To provide these same people with the view of this equipment as a tool to be exploited by the library and thus to guarantee that they would present this equipment to the public in the framework of the library picture. In this way the exhibit becomes a library exhibit and not an equipment exhibit. It is only the professional librarians that are directly in the position to present this picture; (c) To imbue these professional personnel with an enthusiasm about the potentialities of data processing equipment as a tool in the library so that when they return to their homes scattered throughout the country, they will examine their own libraries' needs critically and without fear concerning the effects of technology.

In the latter respect particularly, as Dr. Hayes developed the content of his course, he pointed up the areas of responsibility in the field of information science. He delineated areas of responsibility for: (1) the user, (2) the operator, (3) the designer, and (4) the supplier of equipment. Such a fundamental introduction to documentation must be in the minds of every new library school graduate as well as library school alumni in the 20th century -- we cannot wait for the 21st century. This means that library schools must make room in the one calendar year of the Master's program as well as by institutes and short courses for this new field of endeavor. Several methods have been suggested for achieving this specialization, notably the introduction of a limited prerequisite at the undergraduate level. This is in consonance with the new ALA Undergraduate Library Science Standards as well as the earlier ALA Standards for Graduate Library Education. Perhaps certain aspects of information science can be accomplished as part of undergraduate education in such disciplines as logic, philosophy, communication and the techniques of programming, while others which are interdisciplinary can best be accomplished at the graduate level.

Finally, Dr. Hayes' course syllabus and the photographs of his visual aids in this report can serve as a point of departure for the development of the information science curriculum in all of our institutions of higher education. However, if this is to happen, the library school faculty must take the leadership in coordinating this effort before it is too late for achievement or the new program commences without the collaboration that library educators can give.